Report of the
Board of Directors of
Ontario Hydro for the Year 1985

To:
The Honourable Vincent G. Kerrio,
Minister of Energy

We, the Board of Directors, submit to you this report of the financial position and relevant Ontario Hydro activities for the year 1985. We would like to thank you and the staff of the Ministry of Energy for the cooperation and understanding extended during the year.

On behalf of the Board,

Tom Campbell

Tom Campbell, Chairman
April, 1986

Choices, Options, Directions

In the early years of this century, Ontario Hydro was created to meet a growing province's demand for reliable and affordable electric power. For over three-quarters of a century, we have met that demand, providing the people and industries of Ontario with electricity when and where they need it.

As we move toward a new century, our commitment to reliable and economical electricity continues to direct our activities. But to meet that commitment tomorrow, we have to start planning today.

Unlike other energy forms such as oil or natural gas, electricity can't be stored for future use. However, our supply system still has to be able to meet the electricity needs of our customers on the darkest and coldest day of the year.

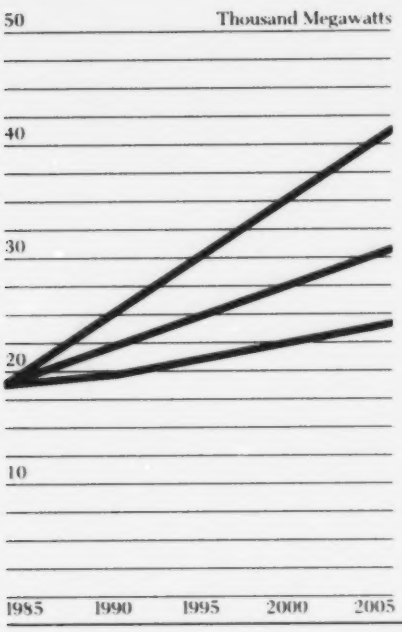
How much power will we need on a frigid January day 12 years from now? That's an important question because it takes that long to plan and build for emerging needs. It is also a tough question because there are so many variables affecting electricity use in everything from competing energy prices, to changes in population, to levels of economic growth.

Even taking all these into account, we recognize that the future can unfold in a number of different ways. So, in making our forecasts, we look at a wide range of possible scenarios. According to the most probable scenario, we expect a growth in demand for electricity of 2.6 per cent annually until the year 2000.

But things could be different. Demand growth could be significantly higher or lower. When projected to the end of this century, the difference between our upper and lower forecasts is about 12,000 megawatts. An additional 12,000 megawatts of demand is equivalent to just over three Darlington-sized stations. (Darlington's installed capacity will be 3,600 megawatts.)

So we have to plan carefully. Right now, we have enough power in place to meet our current needs. With the completion of our Darlington station in 1992, we will be able to meet the province's most probable level of demand for electricity through the late 1990s, along with maintaining a customary "reserve margin" of power for emergencies.

Ontario Hydro Primary Demand
1985-2005



But what will we do then? If we're going to need more power, common sense tells us we had better start considering our choices now. We have a number of options for meeting future electricity needs – some on the supply side and some on the demand side. The prudent course is to explore these various options and determine which combination will allow us to meet future demand in the most efficient and cost-effective way.

So what are our electricity choices for the future? Ultimately, we can generate it ourselves, buy it from someone else, or control how much of it we need. We believe the best course for our energy future will be a combination of all three.

One supply option that we've chosen in the past is building new plants.

Hydraulic power was the cornerstone of Ontario Hydro's supply system. But we're running out of large potential sites where the water falls far enough and fast enough to produce significant amounts of economical power. Even so, we are now exploring what smaller sites can offer.

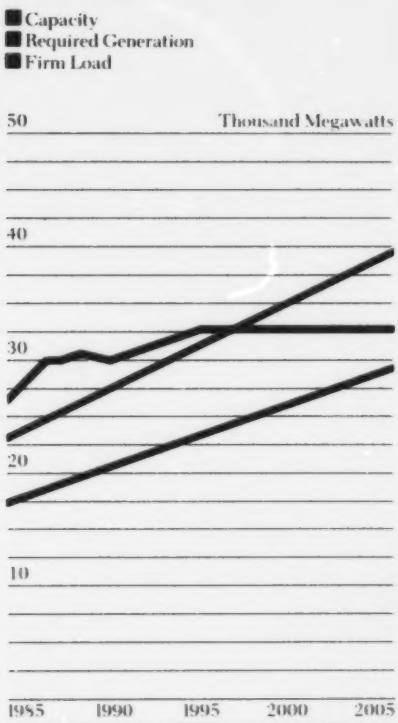
While the potential for additional coal-fired stations is high, the practical problems of fuel prices and acid gas emissions have to be surmounted.

Finally, there's nuclear energy. It has been a part of Hydro's supply system for more than 20 years. With the completion of our Darlington station, nuclear energy will play a predominant role in Ontario's electricity supply.

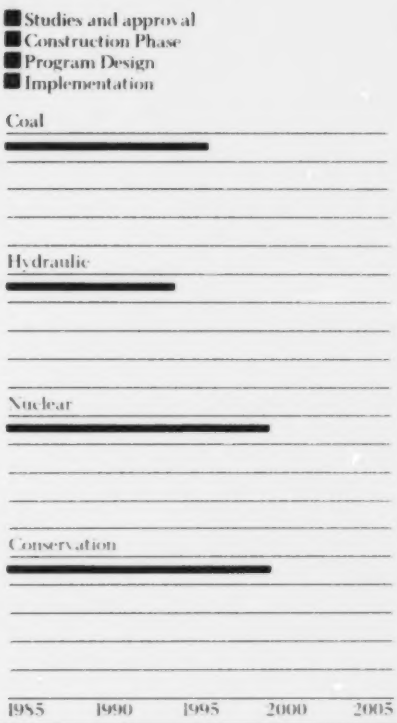
Building any plant – nuclear, coal, or hydraulic – is a costly and time-consuming process. A hydraulic or coal-fired plant takes about 10 years to build. For a nuclear plant, the lead time could be up to 14 years. And, in a climate of uncertain demand, committing ourselves to major new plants may not be the most flexible solution to meeting our energy needs.

We may, however, be able to refurbish older plants. For example, Ontario Hydro has over 12,000 megawatts of fossil-fired capacity. Several of our coal units are coming close to the end of their service lives. By refurbishing these older plants, we can lengthen their service lives significantly. At the same

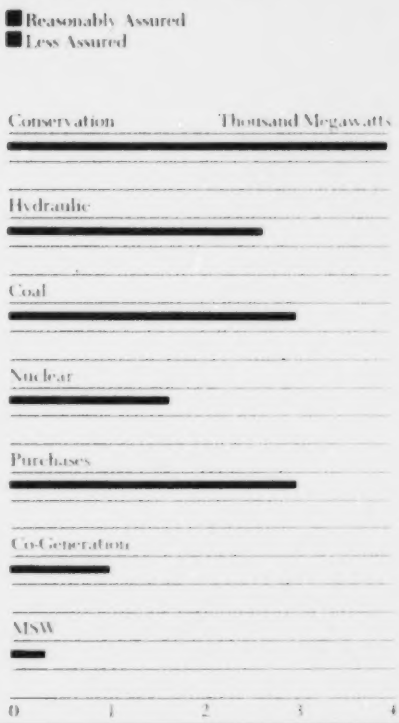
Planned Generation vs. Most Probable Load Growth



Lead Times to Meet Energy Needs



Potential Contribution to Power Requirements by Year 2000



time, we can equip these plants with state-of-the-art emission control technology, thereby reducing acid gas emissions.

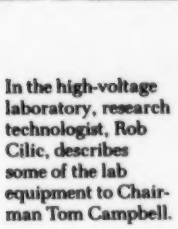
Other supply options include alternate energy sources such as solar and wind power or the burning of municipal solid waste (MSW). While not likely to be major contributors to Ontario's power supply, these sources could be valuable in specialized applications. Using specialized applications where appropriate is part of our planning philosophy. We recognize that energy needs will develop differently in various parts of the province, and that some options will work better in some areas. Our planning will reflect that diversity.

Beyond generating electricity ourselves, we could buy it from other utilities and producers. We do import some power today, in peak and emergency situations or when buying it is more economical than producing it ourselves. We may consider making more firm purchase arrangements with neighbouring utilities so that the imported power acts as a dependable supplement to our power supply. In addition, we may be able to tap into other sources of generation within the province by encouraging independent producers to sell power to us through cogeneration or other parallel generation schemes.

There is another alternative. Rather than always increasing supply to meet the demand for electricity, we can also moderate that demand. This can, in turn, reduce the need for more supply. That's the essence of demand management. We've been practising demand management through conservation for several years. In fact, conservation and other demand-oriented options are likely to play a significant part in tomorrow's energy picture.

Which of these options will we choose? That's what we're determining right now. Looking at a whole range of options will help us find out how we can best meet Ontario's electricity needs in the coming years. It's clear that no single option will do this. Rather, a combination of options, carefully chosen and properly timed, will be the key to our electricity future.

Chairman's Message



In the high-voltage laboratory, research technologist, Rob Cilic, describes some of the lab equipment to Chairman Tom Campbell.

During 1985, Ontario continued to benefit from a strengthening economy. The improvement in the provincial economy was reflected in an increased demand for electrical power. As the province's main producer of electricity, Ontario Hydro is responsible for meeting that demand.

It is a responsibility we take very seriously, and a job we do well. Ontario Hydro has been successfully meeting Ontario's electricity demand for over 79 years. Our rates remain among the lowest in the world, our service is reliable, and our commitment to high safety and environmental standards is firm.

The system we have in place now, with the addition of Darlington, and the much-needed transmission facilities in eastern and southwestern Ontario, will meet electrical energy needs in the short term. However, Ontario Hydro must also ensure that the province has the electrical energy it needs in the longer term.

For the last 15 years, growth in demand for electricity has outpaced economic growth. Our forecast for annual load growth to the end of the century is 2.6 per cent. Yet, this year our actual growth was over 3 per cent. And it appears that electricity consumption will continue to increase. In fact, global electricity generation is expected to double by the year 2000. So sound management principles dictate that we start planning now to secure Ontario's energy future.

Electricity is not Ontario's only energy option but it is quickly becoming the province's most attractive one. There are good reasons for its emergence as Ontario's preferred energy.

First, electricity is primarily a made-in-Ontario form of energy. Ontario Hydro meets over two-thirds of the province's electricity demand with a blend of hydraulic and nuclear generation. Using Ontario's abundant stock of water and uranium protects the province from fluctuations in the cost and availability of imported forms of energy. The remaining one-third of Ontario's electricity is produced from coal.

As well, electricity is more versatile and controllable than other energies. This property makes electricity ideal for electrically-intensive processes. Some of Ontario's major industries, such as pulp and paper or iron and steel, are finding more and better uses for electrical energy. As Ontario shifts toward an economy shared increasingly by high-tech industries, the application of these and other electrotechnological processes becomes vital to keeping provincial industries competitive.

Ontario Hydro is not just in the business of producing electricity. By keeping rates low, we provide an underlying support for the whole provincial economy. A stable and low-cost electricity supply encourages and attracts new investment.

So there are many reasons why electricity will continue to be the province's preferred form of energy and why Ontario's economic well-being will depend on a secure supply of electricity. These reasons emphasize the need to start planning now for electricity requirements beyond the 1990s.

This year has brought us closer to defining future electricity require-

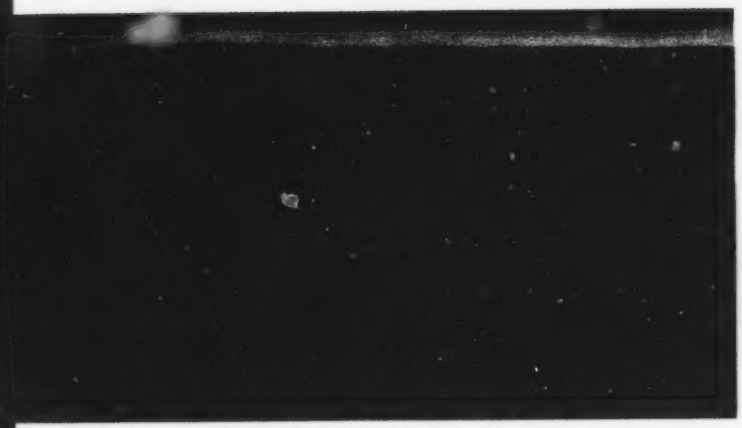
ments and identifying the choices we face to meet those needs. We are studying both supply and demand options to determine the direction our electricity planning should take. Whatever that direction, our customers will play a major role in helping us evaluate the options; their participation is key to our planning decisions. As always, our commitment to our customers goes hand in hand with our commitment to an affordable, reliable and safe electricity system.

The most important asset we at Hydro have is our people. Their expertise, dedication, and hard work will be as essential in the coming years as they have always been. I'd like to thank all our employees for their contribution during 1985. I would also like to thank the Board of Directors for their guidance, and the municipal electrical utilities, together with their representative organizations, for their cooperation and support in serving the electricity consumers of Ontario.

I would like to extend a very special thanks to Hydro President Milan Nastich, who retired from the Corporation this year after a remarkable 37-year career with Ontario Hydro. Milan Nastich's foresight and sound leadership proved invaluable to the Corporation. He leaves an outstanding record of achievement.

Finally, I would like to welcome Milan Nastich's successor, Robert C. Franklin, appointed President by the Ontario Hydro Board of Directors, effective February 3, 1986. Mr. Franklin comes to Ontario Hydro with many years of experience in a large public service company: he served as President of CN Enterprises, Executive Vice-President of CN Railways, and Chairman of the Board of CNCP Telecommunications.

The diffuser-discharge tunnel constructed at the Darlington Nuclear Generating Station will hold the warm water discharged from the station before entering the lake. While in the tunnel, the discharged water mixes with lake water which seeps into the tunnel through specially designed outlets, thus further protecting the shoreline environment.



Ontario's electricity supply system was built on water power. But the potential for additional hydraulic developments that can produce electric power at a reasonable cost is limited. Even so, there are some possible hydraulic sites left, particularly in the north. The Little Jackfish River (above), which flows into Lake Nipigon, is one example. This year Hydro authorized studies of three locations, including this one, to determine whether they are suitable for further development. If Little Jackfish proves suitable, a generating station could be in place there by 1993. Recognizing our responsibility for meeting future energy needs, Hydro is working to identify and develop other hydraulic sites.

Changing with Ontario

In 1985, more clearly than ever before, Ontario Hydro remained a corporation responding to the changing needs and priorities of Ontario's citizens.

As the province's economy recovered from the recession of the early 1980s, demand for electricity started to pick up. And that trend continued during 1985. Primary sales of electricity – that is, delivery of energy to Ontario customers – climbed 3.1 per cent in 1985. This is consistent with the 3.2 per cent average annual energy growth during the last five years. Fully 116 billion kilowatt-hours of electricity were delivered to provincial consumers.

Ontario Hydro's rural retail system experienced a growth of over 15,000 customers in 1985, bringing the total number of customers now served to almost 800,000. This two per cent increase is the largest in almost 10 years and continues the trend of the last four years.

Ontario Hydro also provides electricity, by means of diesel generators, to many remote northern Ontario communities which are isolated from the provincial electricity grid. A total of 18 remote communities, generally populated by native people, were served in 1985 in accordance with conditions agreed to by Ontario Hydro, with financial support from the provincial and federal governments.

Hydro also sold power to neighbouring utilities, chiefly in the United States. Revenues from these secondary sales help to keep rates low in Ontario

and they strengthen Canada's balance of payments. In 1985, Hydro earned $145 million from electricity exports of 8.6 billion kilowatt-hours.

In all, Hydro delivered 124.6 billion kilowatt-hours of electricity to its primary and secondary customers.

Along with the total consumption of electricity, peak demand also climbed in 1985. Lower-than-normal December temperatures meant that the demand for electricity reached record heights. Consumption records were surpassed three times during the month. The December 18 peak demand of 20.5 million kilowatts was well above the 1984 record of 18 million kilowatts. This is the largest absolute increase in load in Ontario Hydro's history.

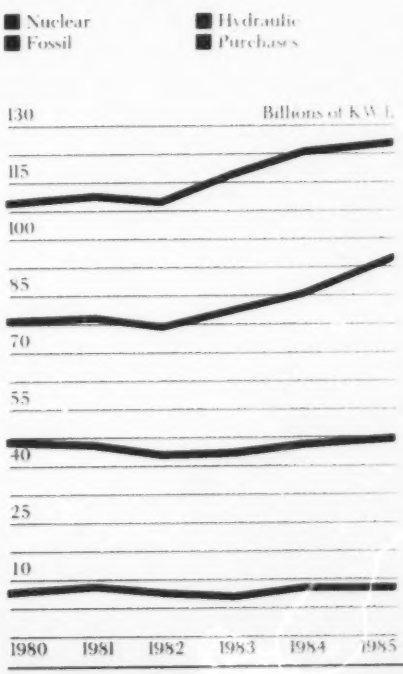
Nuclear energy accounted for an unprecedented 39 per cent – or 48.5 billion kilowatt-hours – of Ontario's electricity. Ontario Hydro will rely increasingly on nuclear energy in the coming years as new units now under construction are completed. In fact, it is expected that two-thirds of Ontario's electricity will be generated by nuclear energy in the 1990s. By lessening the province's reliance on fossil fuels, CANDU plants contribute to reducing acid gas emissions. These units also help keep rates low, since a kilowatt-hour of electricity from nuclear generation costs 2.92 cents, compared with 3.91 cents from a coal unit.

The Corporation also depended on two other major sources of generation – hydraulic and thermal.

Hydraulic energy is Ontario's least-cost source of generation, at about 0.82 cents per kilowatt-hour. In 1985, hydraulic stations supplied 30 per cent of the total energy generated. In absolute terms, water power accounted for 37.4 billion kilowatt-hours in 1985.

Hydro's coal-burning plants provided 24 per cent, or 29.9 billion kilowatt-hours, of Ontario Hydro's generation in 1985. Thermal stations retain an important place in Hydro's planning because they provide the system with much-needed flexibility. They can be brought on-line in a matter of

Energy Made Available



hours, and they supply crucial "peaking power" during the coldest months.

Finally, Hydro bought power from other utilities, most of it from Quebec and Manitoba. These purchases provided 7 per cent of Hydro's electricity requirements, or 8.8 billion kilowatt-hours, at a cost of $163 million. This purchased electricity helped reduce Hydro's dependence on costlier fossil-fuelled plants.

Although Hydro is currently winding down a period of major construction activity, we continue to provide a significant number of direct and indirect jobs in that field. In 1985, we provided 9,000 person-years of construction labour and 4,800 person-years of project management and engineering. These figures are expected to decline in coming years as Hydro's building program winds down.

New contracts for goods and services fell from $816 million in 1984 to $722 million in 1985. Roughly 82 per cent of these orders were placed with Canadian companies, chiefly in Ontario. However, the value of goods and services that Hydro purchased in 1985 rose by $67 million to $977 million.

Hydro's net borrowing has also declined as construction activity declines. Between 1982 and 1985, gross borrowings dropped from $2,805 million to $1,781 million, while net borrowings fell still more sharply, from $2,172 million to $757 million. This trend toward lower net borrowing should continue into the 1990s.

All of these considerations – growing reliance on nuclear energy, downsizing, diminished building activity, and lower net borrowing – will help Ontario Hydro to keep rates affordable during the coming years.

In 1985, the Corporation initially proposed an average increase of 3.6 per cent for 1986, while the Ontario Energy Board recommended 4.9 per cent. The final figure – 4.0 per cent, which was approved by Hydro's Board of Directors in October – represents the lowest rate increase in 20 years for municipal utilities, and the lowest for direct industrial customers in 14 years.

On May 31, 1985, a tornado tore through central Ontario devastating parts of Barrie, Grand Valley, Orangeville, Alliston and Tottenham. Several transmission towers in the area were ripped from the ground. Hydro crews worked around the clock to restore power to most of the affected customers within two days.

Parallel generation could make a small but significant contribution to meeting the province's future energy needs. Private generators who produce electricity for their own purposes could be encouraged to sell some of the electricity they produce to Ontario Hydro. In some cases, private generators may wish to sell their total capacity. A recent increase in the rates Hydro pays for parallel generation has made this option more attractive for individual developers. At this small hydraulic development near Dundas (below), Ontario Hydro helped a private developer finance the interconnection of his system to our distribution lines.

Hydro's effort to keep rates low also helps make Ontario an attractive place for industrial development. Electricity rates in this province are among the lowest in the world, well below the charges for a kilowatt-hour in Germany, France, and Sweden, and less than half the levels in Japan and in many U.S. cities.

1985 Highlights

In the spring, Hydro and the Ontario Hydro Employees Union (OHEU) were unable to reach a satisfactory settlement of contract negotiations. As a result, early in May, the 15,000 employees represented by the union went on strike. It was the first such job action since 1972, and only the third in the Corporation's 79-year history.

A new agreement, calling for a resumption of work and a process of mediation and arbitration of outstanding issues, was reached 12 days after the strike began. Both sides then signed a two-year collective agreement. The provincial arbitrator subsequently awarded OHEU members a 5 per cent pay increase and strengthened the provisions for job security.

On Friday, May 31, Ontario Hydro faced another challenge – a series of tornadoes that levelled homes and power lines in central Ontario. The storm toppled four towers on the Bruce-to-Milton 500-kilovolt line and six towers on the 500-kilovolt line between Essa and Claireville, as well as towers on two 230-kilovolt lines and poles on countless low voltage lines.

Emergency control centres were set up in Head Office and in the Georgian Bay, Central and Western regions to coordinate the movement of employees and materials. Employees worked around the clock in these regional and area offices, as well as at Hydro's Kipling Complex, to keep supplies moving to the stricken areas. Within days, wooden pole bypasses had been erected and service restored to most customers. Hydro's staff also contributed very generously to a Tornado Relief Fund.

The sudden, massive damage caused by the storms triggered the first operation of the new Bruce Load and Generation Rejection (LGR) System Protection Plan. This automated control plan, in service since March 7, was designed to deal with loss of the Bruce-to-Milton 500-kilovolt line. Whenever both circuits of that transmission line are unexpectedly removed from service simultaneously, the LGR system immediately cuts off up to four of the Bruce generators and up to 1,500 megawatts of customer load to protect the integrity of the interconnected transmission grid and limit the extent of customer interruptions. On May 31, the plan served its purpose well.

Later in the year, Ontario Hydro responded to Massachusetts Electric's appeal for assistance in dealing with the aftermath of Hurricane Gloria. The September storm downed power lines throughout New England and left more than 100,000 consumers in that part of the U.S. without electricity. With less than 12 hours' notice, Hydro sent 20 line crews and five forestry crews south. Putting in 16-hour days, Hydro employees helped restore power in both Massachusetts and Rhode Island.

During September and October, the provincial Select Committee on Energy held hearings on the Corporation's plans and activities. Twenty-one individuals from Ontario Hydro appeared before the Committee, as did 102 other witnesses representing a broad range of groups and viewpoints. In all, Hydro committed internal resources in excess of 8,000 hours to this task in 1985.

One of the primary disadvantages of coal is the acid gas emissions it creates. While Hydro's current emission control program includes greater reliance on nuclear power and increased purchases of hydraulic power from neighbouring utilities, it also emphasizes using pre-washed and low-sulphur coal in our coal-fired plants. Several new coal technologies, including Hydro's experimental limestone injection scrubbers at the Lakeview Generating Station, are being investigated and tested. To play a larger role in meeting future energy needs, coal plants would have to burn low-sulphur fuel or be equipped with state-of-the-art emission controls.

Ontario Hydro officially opened Atikokan Generating Station, on November 27, 1985. Atikokan burns low-sulphur coal (lignite). The 200-megawatt unit increases generating resources in the northwest by 20 per cent. It also boosts the region's self-sufficiency, which in turn makes northwestern Ontario more attractive to industry.

The hearings focused on the future of the Darlington Nuclear Generating Station. Hydro's management and employee representatives welcomed the opportunity to discuss Darlington's role in Ontario's future electricity supply. Even if demand were to grow as slowly as one per cent a year, Darlington would still be needed to meet power demands economically in the 1990s. The Committee was told that cancellation of two of the four units would significantly raise electricity rates, as well as increase acid gas emissions.

In December, the Select Committee issued an interim report with three recommendations. The first two called for a closer examination of the relationship between the provincial government and Hydro, and a further review of Hydro's options for meeting future energy needs. The third recommendation urged that contracts for Darlington units 3 and 4 only be awarded for materials required for construction during the next six months while the desirability of continuing construction could be more thoroughly assessed. The Committee's final report is expected in mid-1986.

Coal's Continuing Contribution

Coal-fired stations provide Ontario Hydro's generating system with an important element of flexibility. For example, on several days in January 1985, coal-fired plants supplied more than 40 per cent of power during this peak period when cold weather and shut-down nuclear units put severe pressure on Hydro's power resources.

In November, the Corporation placed in service a new coal-fired plant, Atikokan Generating Station, located 225 kilometres west of Thunder Bay. This $748-million, 200-megawatt facility is capable of supplying 20 per cent of northwestern Ontario's electrical needs. It also increases the reliability of the local power system.

Construction of this plant strongly benefited the local economy which had been severely affected by the closing of nearby iron mines. Many local workers were hired over the course of seven years to build the station. Fifty-five people are employed full-time to operate the plant.

Hydro and the Ministry of the Environment are committed to protecting the air, water, and land around the Atikokan station. Continuous monitoring of air and water will ensure that acidic emissions are low and discharge water meets all regulations. Low-sulphur Canadian lignite is burned to help reduce sulphur dioxide emissions, and fly ash collection systems eliminate 99.5 per cent of particles from the gases before they enter the stack.

Hydro's Acid Gas Reduction Strategy

Hydro is committed to reduce sharply the level of acid gas emissions from our coal-burning stations. The chief objects of concern are sulphur dioxide and nitrogen oxides, which are created during the coal combustion process. In 1985, total emissions from Ontario Hydro's coal-fired stations were about 400,000 tonnes, a significant decline from the 1984 total of 519,000 tonnes.

In December 1985, new regulations were issued by the provincial government. The limit in and after 1986 was reduced from 450,000 to 430,000 tonnes, the limit in and after 1990 was reduced from 300,000 to 280,000 tonnes, and the limit in and after 1994 was reduced from 300,000 to 215,000 tonnes. This directive puts increasing pressure on Ontario Hydro to meet the new emission limit in a reliable and cost-effective way, but we

are confident that we can meet this new target successfully.

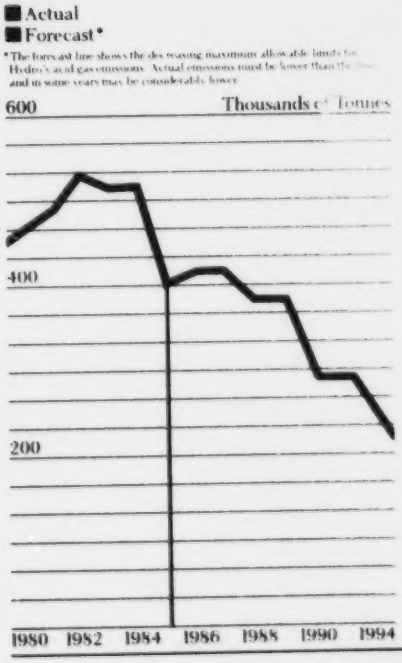
The Corporation is exploring several approaches to reducing acid gas emissions while continuing to provide reliable and affordable power to Ontario's citizens. Increased use of nuclear energy is one part of the solution. A key element in Hydro's reduction strategy is a reliance on our CANDU nuclear units – those now in operation and those under construction at Bruce and Darlington – and hydraulic stations to meet the bulk of Ontario's electricity requirements. As well, Hydro is exploring the possibility of increased purchases of electricity from neighbouring utilities in the 1990s.

Controlling the sulphur content of the coal burned is another part of our reduction strategy. Hydro washes most of the bituminous coal used to remove surface sulphur. Low-sulphur, western Canadian, bituminous coal is blended with high-sulphur, higher-combustibility, American coal at Nanticoke Thermal Generating Station. This blending achieves the required combustion characteristics for which the Nanticoke units were designed. These steps already have had an impact. In the last 10 years, the average sulphur content of the coal Hydro burns has decreased to 1.6 per cent from 2.4 per cent.

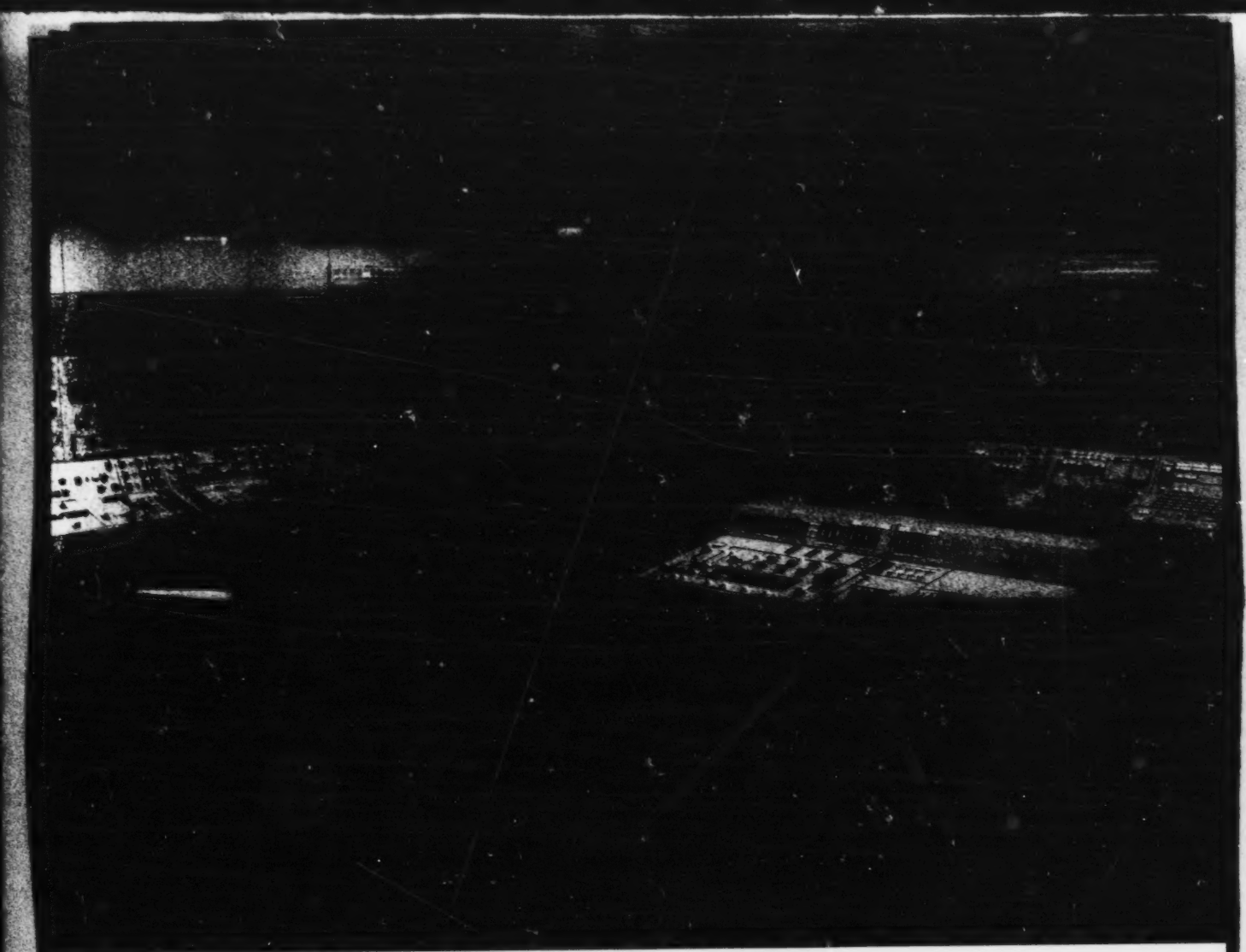
Hydro carried out preliminary tests during 1985 on limestone injection scrubbing at one 300-megawatt unit at its Lakeview Generating Station. In this process, powdered limestone is blown directly into the furnace where it combines with the sulphur dioxide to form calcium sulphate, which is then collected with the ash. This approach promises to be less expensive than the installation of flue gas scrubbers. Initial results of removal of up to 40 per cent of the sulphur dioxide are encouraging, and efforts to improve this process will continue in 1986.

The Corporation is also working with the Tennessee Valley Authority (TVA) in the United States on the development of a lime spray dryer system to reduce sulphur dioxide in

Acid Gas Emissions



*The forecast line shows the decreasing maximum allowable limits for Hydro's acid gas emissions. Actual emissions must be lower than the [illegible] and in some years may be considerably lower.



the flue gas. Tests should begin in the fall of 1986 at TVA's Shawnee Power Plant.

Other efforts have focused on the reduction of nitrogen oxide emissions. In 1983, a burner modification program was tested on Nanticoke units 5 and 6. These two units were fitted with low-nitrogen oxide burner nozzles. As a result, nitrogen oxide emissions were lower; however, the modifications also decreased efficiency and increased particulate emissions. Further testing in 1985 solved these problems so that satisfactory boiler efficiency has been attained, the particulate emissions have been eliminated, and a 30 per cent reduction of nitrogen oxide emissions has been reached.

Ontario's Hydraulic Resources

Since the establishment of Ontario Hydro in 1906, water power has been the cornerstone of Ontario's electricity supply and continues to provide much of the province's electrical energy.

While the potential for increasing the role of hydraulic power is limited, several developments in 1985 marked the Corporation's continuing involvement with hydroelectric power. A program was instituted to check the safety of all 280 dams that Hydro operates, as the average age of these structures is 50 years. Such an assessment is one of our safety priorities. The complete inspection of these facilities is expected to take seven years.

Hydro's Board of Directors also approved the study of three possible sites for the development or redevelopment of hydroelectric stations.

A new station on the Little Jackfish River, which flows into Lake Nipigon in northwestern Ontario, could be in service by the end of 1993. The existing hydraulic stations on the Mattagami River in northern Ontario are a second area of interest. Extensions and redevelopment of these stations could produce 856 megawatts of electricity, almost double their present capacity. Finally, Hydro is investigating the possibility of replacing some of the older facilities at Niagara Falls with a

The success of Ontario Hydro's nuclear program is due partially to the comprehensive training that nuclear operators receive. The nuclear training simulator, located at Pickering, is an exact replica of the station's control centre. Here, operators-in-training can get some hands-on experience in running a nuclear plant.

As a heavily industrialized province, Ontario has considerable potential for cogeneration. This process can combine the production of both electricity and steam heat from a single fuel source. It is particularly attractive if that fuel is a waste product. Hydro is exploring which incentives are most effective in encouraging more industrial cogeneration because it could provide the province with an additional source of generation for the future. For example, we recently signed an agreement with Chapleau Cogeneration Limited to buy electricity produced from the wood waste of local lumbering operations. Previously, this wood waste was simply transported to cone burners (below) and burned off.

new 540-megawatt generating station during the 1990s to increase energy output.

Hydro's Commitment to Nuclear Energy

The success of Hydro's CANDU reactors over the past 20 years is a strong endorsement of Ontario's nuclear program. These units have performed more reliably and efficiently over their lifetime than any other type of reactor. At the end of 1985, five Ontario Hydro CANDU reactors ranked among the top ten performers in the lifetime capacity factor category in a rating of 212 reactors worldwide.

Hydro's busiest construction site in 1985 was the Darlington Nuclear Generating Station. Darlington started the year with fewer than 4,000 construction workers and by year's end had almost 6,000 on site. Activity concentrated on units 1 and 2, whose in-service dates are 1989 and 1988 respectively. All four 365-tonne steam generators for unit 2 were put in place this year.

At Hydro's Bruce station, unit 5 went into commercial service in March, one month earlier than forecast. In July, units 5 and 6 were uprated from 845 megawatts to 865 megawatts, and later in the year to 885 megawatts. Unit 7 neared completion in 1985 and is expected to be placed in service by April 1986.

At Pickering Nuclear Generating Station, unit 7 was declared in service in January. Unit 8 was nearly ready to go into commercial operation at year's end.

Pickering Retubing

The retubing of Pickering units 1 and 2 continued during 1985. These reactors remained shut down, as they have been since 1983 when a cracked pressure tube was discovered in unit 2. The Zircaloy-2 tubes used in units 1 and 2 are being replaced with zirconium-niobium tubes, the type used in all of Hydro's other reactors. Hydro expects to have both units back in service in early 1987.

Nuclear Safety a Priority

Safety has always been a priority in Hydro's nuclear program. Hydro's CANDU reactors are designed with multiple barriers so that if a problem does emerge, such as a cracked pressure tube, the public is still protected. Radiation levels near the nuclear stations are carefully and continually controlled and monitored.

Hydro has also worked steadily to further improve the safety and working conditions of our nuclear operating staff. Although the level of radiation exposure has always been well below federal government limits, the total amount of radiation received by nuclear operating staff and contractors in 1985 was the lowest it has been since 1968.

Ontario Hydro's nuclear operating staff extended its safety record to more than 100 million hours and 30 years worked without an on-the-job fatality.

Finally, the construction of a tritium removal facility at Darlington continued. Tritium, which is an isotope of hydrogen, accounts for a significant portion of the radiation dose to nuclear workers. This substance gradually builds up in the heavy water systems of operating units. The removal facility is designed to isolate and extract tritium from the heavy water, substantially reducing the radiation exposure. The facility is scheduled to begin operation in May 1987.

More generating capacity is needed in peak periods of electricity use than non-peak periods. By shifting some of that peak load, we can reduce the need to build new generating plants. In the short term, using more off-peak electricity can result in considerable cost savings for customers. The challenge is to design load management programs and equipment that provide adequate incentives for customers to change their pattern of electricity consumption. Digital load management programmers can monitor and control electricity consumption (below) so that some loads can be automatically shifted to off-peak periods. This type of system has a lot of potential for apartment and commercial buildings.

R-2000 homes are built to a high energy efficient standard. They have extra insulation, vapour barriers and a special ventilation system that controls humidity and includes a heat-recovery device. R-2000 homes can save up to 75 per cent on heating costs over a conventionally-built house. These homes, now under construction in a Mississauga development, are all-electric.

Other Sources of Energy

While coal, hydraulic, and nuclear power remain the primary sources of Hydro's current electricity supply, the Corporation is actively exploring a broad range of other options. The rapid pace of technological change suggests that energy sources that are prohibitively expensive now may be attractive for special applications in the future.

For the past several years Ontario Hydro has been investigating the possibility of producing electricity from sunlight. In 1981, Hydro constructed a stand-alone photovoltaic system north of Atikokan to power an air quality monitor. In 1984, a solar cell system was erected at the Kortright Conservation Centre near Toronto. On sunny days, these cells satisfy specific local needs and can supply the Township of Vaughan with up to one kilowatt of power.

This past year, Hydro tested several different solar arrays at Kortright, as part of the preparations to install a 10-kilowatt photovoltaic unit at Big Trout Lake in northern Ontario. This remote community receives 85 per cent as much sunshine as Florida. At present, its needs are supplied by generators that run on costly diesel fuel. By contrast, the price of solar cells has been dropping. For example, in 1981, solar units cost five times as much as they do now.

For Ontario, wind-generated electricity appears practical only in a few northern communities where wind currents are strong and the cost of alternative power sources is high. In 1985, Hydro began a project to install a 60-kilowatt wind turbine in Fort Severn, the northernmost settlement in the province. The foundation and the instrument building have been erected, and the turbine is now being tested in Scotland. The complete unit will be installed at Fort Severn in the summer of 1986.

Fusion power is another area that holds great promise but is still in the experimental stage. Ontario Hydro is the operating manager for the Canadian Fusion Fuels Technology Project. In 1985, Hydro was responsible for overseeing a budget of $4 million and coordinating the activities of more than 25 organizations. Collaborative agreements have been signed with Japan, the United States, and the European Economic Community.

New Initiatives in Energy Management

Cogeneration is another way of meeting a portion of Ontario's electricity needs. It is the simultaneous production of two energies – usually electricity and steam – using a single fuel source. Typically, cogeneration involves an agreement by Hydro to purchase electricity from a firm that has been producing heat or power for its own use only. Ontario benefits from the installation of about 500 megawatts of industrial thermal generation and another 600 megawatts of independently-owned hydraulic generation, chiefly in the pulp and paper, chemical and mining industries.

To promote cogeneration, Ontario Hydro increased the rates at which we buy electricity by 50 per cent in 1985. This has made cogeneration a more attractive prospect for potential cogenerators. For example, Hydro signed an agreement this year with Chapleau Cogeneration Limited. This firm will produce electricity, made from the waste wood of local lumbering operations, and sell it to Hydro.

During 1985, Hydro continued its research into effective conservation initiatives.

This year saw some encouraging

results from a five-year experiment to determine customer attitudes to time-of-use rates. In this experiment, 500 residential customers have been testing 17 rate structures with varying peak and off-peak periods and corresponding prices. While still early in the experiment, these preliminary results are positive. For example, demand during Hydro's busiest hours decreased on average by 4 per cent, while energy use during other periods rose by the same amount. Seventy per cent of the householders involved in this experiment reported that they were pleased to be able to trim their bills by changing consumption patterns.

This shift in load is significant because it can reduce or defer the need to build new generating capacity. Even a 2 per cent shift of peak demand to off-peak can represent one fewer 500-megawatt generating unit.

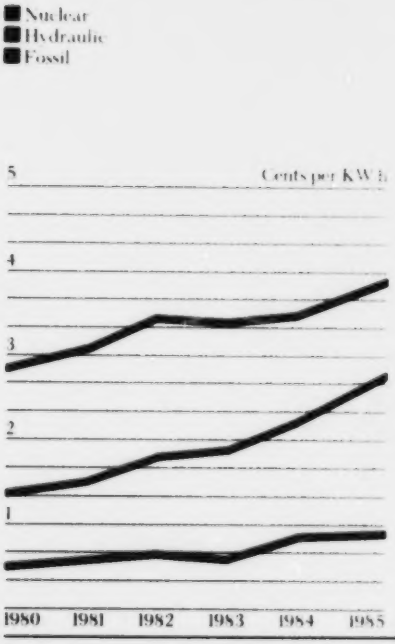
In a different series of load management experiments conducted in Oshawa and Scarborough during 1985, Hydro explored other means of lowering peak consumption through more energy-efficient applications. For example, ceramic brick furnaces, which store thermal energy, allow commercial customers to shift much of their electrical use away from the periods of highest demand. On the residential side, the addition of a second water heater means that a utility can control up to 16 hours of a home's water heating load. The most important finding of these experiments is that, by and large, consumers reacted favourably to direct utility control of domestic hot water supplies and electric furnaces.

Finally, Ontario Hydro has continued to pursue more traditional approaches to conserving electrical power. Ongoing programs such as the Residential Energy Advisory Program (REAP) promote the use of more efficient lighting, appliances, and home heating.

Hydro's Transmission Network

Ontario Hydro's generating stations are only one part of the supply system. A comprehensive transmission network

Average Cost of Generation



to move the power from its source to the consumer is the other requirement. Moreover, the grid formed by the province's transmission and distribution lines gives the system its flexibility, allowing power produced in one part of the province to be delivered to wherever it's needed. These lines also make possible the exchange of electricity with neighbouring utilities.

Ontario Hydro recognizes that, along with this need for the transmission of power, there must be a strong concern for the environment and for the interests of individuals living near the path of high-voltage lines.

During 1985, Hydro began work on a 230-kilovolt line linking the Hamner Transformer Station, near Sudbury, with the Mississagi Transformer Station, located about 75 kilometres from Sault Ste. Marie. The line is essential to meet demand in the Algoma and Sault Ste. Marie areas. It will also strengthen the reliability of supply to customers in northwestern Ontario.

Because the Hamner-Mississagi line runs through some of northern Ontario's most rugged terrain, Hydro's engineers have taken an innovative approach to its construction. Towers are being assembled at 17 locations along the 208-kilometre route, and will be flown to their sites by helicopter. This line should be operating by December 1987, and current plans suggest that it will be upgraded to 500 kilovolts sometime in the 1990s.

Work also commenced during 1985 on a 500-kilovolt line connecting Bowmanville and the Cherrywood Transformer Station near Pickering. This project follows a previously acquired right-of-way and will be in service by March 1987.

Much-Needed Additions

In 1985, we continued our efforts to determine acceptable routes for two 500-kilovolt transmission systems that are urgently needed.

One set of these Extra High Voltage (EHV) facilities is planned for southwestern Ontario, and will connect the Bruce Nuclear Power Development

Transmission lines unlock and deliver the power produced at the various generating stations across the province. Today, Ontario Hydro maintains and operates more than 100,000 kilometres of transmission and distribution lines. A comprehensive transmission network is the key to a flexible electricity supply system.

Ontario Hydro currently imports power during emergencies or when the cost of purchased power is less than what it would cost to produce it on Ontario Hydro's system. Purchasing guaranteed power from neighbouring utilities is an option we might pursue on a larger scale in the future. In fact, considering the hydraulic resources in Quebec and Manitoba, we could have access to several thousand megawatts of capacity. For any long-term firm purchase arrangements of this size, however, we would need additions to our provincial interconnections as well as our transmission network within the province.

with the Barrie area to the east and with the London area and the Nanticoke Generating Station to the south. Once installed, these facilities will allow full use of the low-cost nuclear power produced at the Bruce station.

As early as 1980, a royal commission declared that it was "indefensible" for power to be bottled up at the Bruce station. In order to determine an acceptable route for the proposed transmission line, Hydro conducted numerous public information seminars in the potentially affected areas. As well, route plans and environmental studies were reviewed by government ministries and submitted to the government-appointed Joint Board, under the Consolidated Hearings Act. The process was slowed in 1984 by a Divisional Court decision that adequate public notice of the proposal and the hearings had not been given. However, a new environmental assessment was filed with the provincial government in August and new hearings are now in progress on Hydro's most recent proposal. The delay resulting from this Court decision will have a substantial impact on the cost of power in the late 1980s. Without the transmission facilities in place on schedule, higher cost coal-fired power will have to replace much of the power that would have been transmitted from Bruce.

Hearings also continued during 1985 on much-needed transmission facilities in eastern Ontario. In this instance, the planning and approvals process, which began in the mid-1970s, appears to be reaching a conclusion. The Ontario Supreme Court and the Joint Hearings Board have issued favourable rulings, and a decision by the Cabinet is expected early in 1986.

Hydro's People

People remain the Corporation's most valuable resource. Hydro's corporate strategy, implemented in the early 1980s, presented a real challenge to Hydro and its employees. This strategy called for a shift within the Corporation from an emphasis on construction to a more flexible, customer-oriented organization. This shift meant a substantial downsizing of staff in the design and construction side and some staff and resources moved to the customer side of the Corporation. As a result, the total number of regular employees has stabilized at just over 23,000 in 1985, from a high of 25,249 in 1982.

Hydro has made a strong effort to find positions for employees displaced by changing priorities. This redeployment program has been remarkably successful. In 1985, 96 per cent of those whose jobs were discontinued were transferred to other jobs within the Corporation.

Hydro also launched a program to improve working relationships. The first step in this project was getting together a team of human resources specialists who report directly to Hydro's Senior Executive Vice-President, Pat Campbell. This team interviewed over 700 employees from all branches. A report with recommendations is expected in the early spring of 1986.

Personnel officers, line managers, and other individuals devoted considerable energy in 1985 to one of Hydro's long-standing concerns – human rights. Over 2,000 employees were involved in nearly 100 training sessions touching on such topics as discrimination in the workplace and services for the handicapped. A regular newsletter reinforced these efforts.

On August 22, 1985, the Hydrokids Day Care Centre officially opened. The centre can accommodate a total of 54 infants, toddlers and pre-schoolers.

Current alternate sources of energy are not suited to make substantial contributions to our future electricity supply. But they will play an important role in specialized applications. For example, solar cells, which convert sunlight directly into electricity, could prove useful in remote northern communities where the alternative is even more expensive diesel-powered generators. Wind generation is also an alternative that has some potential for use in the north. Another option, burning municipal solid waste (MSW), could provide up to 300 megawatts by the year 2000. Although municipal waste is not a high-grade fuel, this process has the dual advantage of waste disposal and electricity production.

Affirmative Action

Ontario Hydro strengthened its commitment to affirmative action in 1985. This program seeks to provide men and women with the same job opportunities and choices.

Seventeen per cent of Hydro staff are women. They make up 7 per cent of the management and professional staff, and 2 per cent of the executive group. By contrast, females occupy 79 per cent of all clerical positions in the corporation. Of the more than 11,000 jobs in trades and technical area, only 200 are held by women.

The corporate affirmative action program sponsored a broad set of recruiting, training and development initiatives to encourage the promotion of qualified women into management and into non-traditional areas. Career planning and development for clerical and secretarial staff were also emphasized. Individual affirmative action programs were established within each branch, and line management from each branch made responsible for the success of these programs.

One barrier to female employment fell when the Atomic Energy Control Board revised the regulations that had prohibited women from holding the full range of atomic radiation workers jobs available at Hydro's nuclear generating stations. Hydro played a significant role in bringing about this change. Six women are now in a training program that will lead them to previously restricted jobs within the atomic radiation workers zone. As well, 15 of 80 employees hired as electrical operators in 1985 were women. And during 1985, the first woman was admitted to the lineman training program.

Day Care Available at Hydro

The pressures on many working parents at Hydro were eased by the introduction of workplace day care. Hydrokids Day Care Centre was opened in the fall of 1985. This centre is the result of the initiative of a group of employees who worked along with senior management over the past few years to make the concept a reality. Hydrokids currently has space for 54 children, including spots for 10 infants.

While operating costs will be covered by the parents using the centre, Hydro and the Ontario Ministry of Community and Social Services provided grants to establish this important facility.

Health and Safety

Ontario Hydro's concern for employee health and safety stretches back to the Corporation's earliest days. During recent years notable strides have been made, and 1985 was no exception. For the first time ever there were no on-the-job fatalities or permanent total disabilities among Ontario Hydro's regular staff.

Moreover, the 19,967 days lost because of accidents amounted to only 69 per cent of the 10-year average from 1975 to 1984. The number of days lost in the regions continued its remarkable decline to a level that is less than one-tenth of the figures recorded before the end of the 1970s.

A number of Hydro projects addressed themselves to the issue of the staff's health and well-being. For example, the scope of the Employee Assistance Plan (EAP) was enlarged to help workers with their personal problems, well before such difficulties become debilitating. Union as well as management and professional representatives warmly endorsed these initiatives.

Marketing

At Hydro, marketing is not just selling electricity. It is bringing the needs of the customer and Hydro's ability to meet those needs into the best balance. Marketing includes research, customer service, load management and conservation. In short, it means managing the delivery side of the Corporation.

Marketing also supports the national objective of reducing our dependency on oil and non-renewable fossil fuels. And Hydro's efforts reinforce the provincial goal of using energy sources that are indigenous to Ontario.

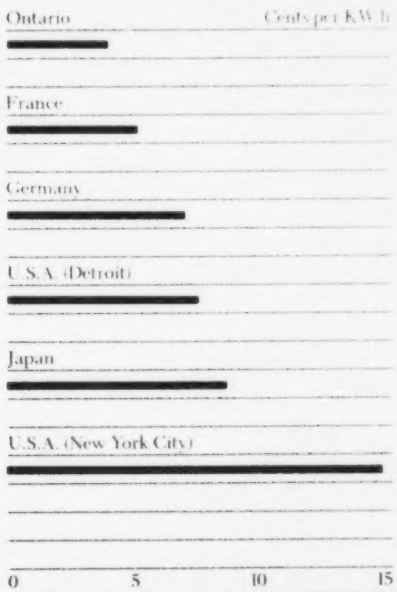
Hydro began the year with a strong push to persuade homeowners to convert from oil to electric heating before the federal government's Canadian Oil Substitution Program expired on March 31. The final tally of electric heating conversions prompted by this program was more than twice the amount targeted.

Hydro's advertising is aimed at making the public more aware of their energy efficiency options. One campaign during 1985 emphasized the efficiency and versatility of heat pumps. Another promotion boosted electrical water heating, prominently featuring the 1985 Toronto Blue Jays and their skill in sending opposing pitchers to the showers. Radio and television spots made the message a familiar one to Ontarians. So did brochures that underscored the advantages of electric water heaters.

The Corporation also introduced the EnerMark Loan Plan, a program administered by the Royal Bank to provide financing for up to $10,000 worth of home energy improvements. All loans are life insured at no additional cost to the customer, and the rates are kept below prime.

One of the constants in Hydro's marketing efforts is improving our service to customers. To this end, we've introduced some initiatives such as providing telephone service for the hearing impaired among our rural residential customers, accelerating our program to extend electrical service to

Comparative Electricity Price for Industrial Consumers
(1984)



Ontario's remote communities, and instituting more convenient billing arrangements for senior citizens.

Hydro has been active on the commercial and industrial side as well. A highly successful initiative of 1985 was the production of "The Source", an authoritative information guide detailing electrical design in commercial applications. It includes hundreds of examples of design calculations and general industry standards using both imperial and metric units. Aimed at architects and consultants, it has generated a great deal of enthusiasm in the few months it has been available.

There are a number of opportunities in industry where electricity could be used to greater advantage. For example, during 1985, Hydro worked with the mining sector to promote electric mine air heating. As a result, Canimex Mines and Noranda have installed electric systems in some of their mine sites.

CAE Diecast, a St. Catharines area foundry, installed a third electric furnace for its aluminum melting operations. In another instance, Hydro and municipal utility staff worked for months with Benn Iron of Wallaceburg, an effort which led to the installation of two electric induction furnaces.

Saputo Cheese Company of Cookstown adopted a mechanical vapour recompression process for concentrating whey in its cheese production operations. Formerly gas-driven, this process is now running on electricity. This state-of-the-art technology will result in a 75 per cent energy reduction.

Many of Hydro's marketing initiatives have grown out of the close working relationship between the marketing and research areas. The development of the cold climate heat pump is one such example. Because most of the heat pumps on the market are geared to more temperate climates, the prototype heat pump developed at Hydro is designed to meet the heating needs of colder climates. It is estimated that homeowners can save an additional $75 to $150 per

As industry is becoming more automated, industrial processes are becoming more electrically-intensive. Electricity, at its point-of-use, is often more versatile and controllable than other forms of energy. General Motors in Oshawa is using electricity-dependent robotics in many phases of its assembly line operation.

During the 1970s, Ontario Hydro recognized the benefits to customers of energy conservation. Since that time, conservation has been an important factor in utility planning. It will take on an even larger role in the decades to come. Encouraging electrical efficiency in all sectors – residential, agricultural, commercial and industrial – can moderate the level of future demand. The wise use of electricity may decrease the need to add to our supply system as much or as quickly. Keeping our customers informed of energy-saving programs and products is an important part of Hydro's responsibility to meet the province's electricity needs in the coming years.

year with these units. Seven are being tested in homes this winter.

Pursuing New Business Opportunities
Hydro's marketing initiatives also extend to business activities related to, but separate from, the production of electricity. These include the sale of electricity by-products such as isotopes and process steam energy as well as energy technology and expertise. The net revenue these activities earn is applied to the cost of electricity in Ontario. And this helps keep rates low.

In fact, new business ventures are a rapidly growing component of the Corporation's marketing activities. In 1985, the volume of business in this area tripled with more than 60 contracts worth over $25 million.

One example of these efforts is the development and leasing of a mobile polychlorinated biphenyls (PCBs) decontamination unit. Developed in part by Hydro's research team, this equipment transforms the PCBs found in the insulating oil of electrical transformers into common salt and other harmless by-products. The process then allows the oil, a valuable non-renewable resource, to be reused rather than destroyed. Use of the mobile unit on site reduces the need to transport contaminated substances. In 1985, Hydro leased the equipment to Rondar Inc. of Hamilton and this technology will be used across Canada.

Many of Ontario Hydro's new business opportunities lie beyond Canada. Our reputation in energy technology is known and respected throughout the world.

During 1985, the Corporation secured a contract to undertake a five-year training program for electrical transmission maintenance workers in Pakistan. The Canadian International Development Agency (CIDA) funds this $9.8 million program. Hydro has agreed to procure equipment where needed, a provision that should strengthen the commercial ties between Pakistan and Canada and provide significant opportunities for Ontario's manufacturing industries.

Among other examples of the Corporation's international activities is our membership in a consortium that will develop a comprehensive energy policy for Kenya. This East African country is hoping to decrease its reliance on imported fuel, and to alleviate the problems of deforestation, caused by an excessive use of wood for heating.

Finally, Hydro benefited from the sale of three nuclear operator training simulators to American electrical utilities. These sales, which generated royalties of about $1 million for the Corporation, were the culmination of 11 years of cooperation between Hydro and CAE Electronics Limited of Montreal.

A Responsible and Open Organization
Ontario Hydro's mandate is to supply power at least cost over the long term to the overall benefit of our customers. Accordingly, we are very serious about our commitment to be a responsible and responsive organization accountable to the people we serve. Each year, Hydro devotes significant resources to our communication with customers, elected officials, special interest groups, and the general public.

During 1985, Hydro representatives appeared before a variety of official bodies, including the Ontario Energy Board, the Select Committee on Energy, the Joint Board under the Consolidated Hearings Act, the National Energy Board and more than one standing committee of the provincial legislature. Few enterprises of

The construction of transmission lines seemed to fascinate this young visitor to the Ontario Hydro exhibit at the 1985 Royal Winter Fair. The Corporation's community relations people spend a good deal of time travelling to various local fairs and events to meet and talk to the people Hydro serves.

comparable size receive such frequent and intense scrutiny. The costs incurred by the Corporation for participation in these various processes were more than $3 million.

As a publicly owned corporation, Hydro is committed to public consultation in the operation and planning of Ontario's electricity system. This year, the Corporation initiated a series of "Hydro Forums". The chairman, president and other senior officials travelled to Thunder Bay, North Bay, London, and Belleville to meet with local citizens and listen to their concerns. More of these events are planned for 1986. Another public consultation program initiated this year involves special interest groups. One hundred and twenty special interest groups were invited by Hydro to discuss Ontario's future energy needs and how they should be met. Two sessions were held in 1985; more are planned for 1986.

Ontario Hydro also operates five information centres across the province for the public. These are located at the Bruce, Pickering, Darlington, Thunder Bay, and R. H. Saunders generating stations. The newest of these facilities is the Bruce Information Centre. Opened in April, it welcomed almost 4,500 persons during the first three months of operation.

In addition to the formal hearings, community relations initiatives and information centres, Hydro is involved in numerous public communications activities. These activities include an expanding French language services program, a busy Speakers' Bureau, and award-winning film production. This year a French language services administrative guide was prepared, 327 speaking engagements were booked through the Speakers' Bureau for community and industry groups across the province, and two Ontario Hydro videos – "Ask Us" and "Comfort Solutions" – won top awards. Another video produced during the year, a five-part, made-for-cable-TV series entitled "Watt's Up – Getting to Know Ontario Hydro", will be aired in 1986.

Financial Section

Financial Review of Ontario Hydro
for the year ended December 31, 1985

Financial Highlights
Ontario Hydro's activities continue to be guided by its corporate strategy for the 1980s. The strategy encourages the efficient use of electricity and emphasizes productivity improvements and cost control.

Ontario Hydro's total revenues for 1985 amounted to $4,625 million, $413 million higher than in 1984. Approximately $78 million of this increase came from a greater volume of electricity sales, and $335 million from the 1985 rate increase. Total operating costs for 1985, including financing charges, amounted to $4,265 million, an increase of $628 million over 1984. The major factor in this increase in total operating costs for 1985 was new generating units placed in service in 1984 and 1985. To partially offset this overall increase, the 1985 electricity rate increase provided for a level of net income lower than the level for 1984. The net income for 1985 was $360 million compared with $575 million for 1984.

Cash provided from operations and available for investment in fixed assets was $1,055 million for 1985. As in past years, this contributed to Hydro being able to lower its borrowings to finance capital expenditures. The capital expenditures for investment in fixed assets during 1985 amounted to $2,541 million. This represents a steady decline from the 1982 level of $2,885 million as a result of the decrease in the level of construction activity.

Results of Operations

Revenues
Primary revenues for 1985 amounted to $4,274 million, an increase of $491 million or 13 per cent as compared with 1984. Electricity sales to municipal utilities, rural retail, and direct industrial customers totalled 109,215 million kilowatt-hours. The overall growth rate in the volume of primary energy sales was 3.1 per cent for 1985, reflecting the effect of continued economic growth in the Province of Ontario, as well as weather conditions. In 1985, electricity sales to municipal utilities grew more strongly than sales to rural customers while sales to direct industrial customers increased slightly. The chart (see page 26) provides the energy consumption by major customer category and an estimate of the energy consumed by market sector. The overall growth rate for 1985 was generally consistent with the average annual growth rate of 3.2 per cent over the last five years as shown in the Comparative Statistics.

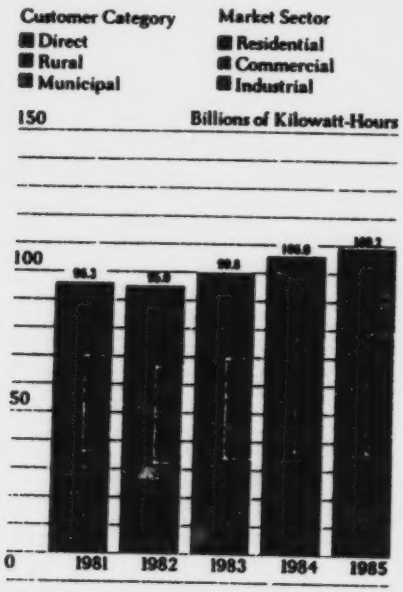
The 1985 electricity rates for primary customers increased 8.6 per cent on average. The average increases for municipal utilities, rural retail and direct industrial customers were 8.5 per cent, 8.7 per cent and 8.8 per cent, respectively. The rural rate increase takes into account $57 million in assistance provided by all electricity consumers in the province to reduce the electricity bills of year-round rural residential customers.

Secondary revenues for 1985, mainly from sales of electricity to American utilities, amounted to $351 million. Compared with 1984, this represents a decrease of $78 million or 18.2 per cent. This decrease reflects the competitive secondary sales market resulting from the current surplus of power and energy available in Canada and the United States.

Over the last five years, Ontario Hydro has earned approximately $2,060 million in revenues from American utilities by selling electricity beyond the requirements of its customers in Ontario. The net benefit to Ontario customers was $822 million for the period 1981 through 1985, and $145 million in 1985. This benefit helped Ontario Hydro to keep electricity rates lower for Ontario customers.

Major Electricity Production Resources
Ontario Hydro responds instantly and efficiently to the energy demands of its customers by supplying electricity from a number of different sources. Hydraulic generating stations, which are relatively inexpensive to operate, have traditionally provided a major part of the electrical energy generated by Ontario Hydro. With most major accessible sites in the province already developed, hydraulic generation, as a percentage of total generation, has remained stable over the past few years. On the other hand, the Corporation

Primary Energy



has increased its emphasis on nuclear generation. This emphasis is part of Ontario Hydro's acid gas emission reduction efforts. The other major source of generation of electricity is fossil generation. Due to the relatively high cost of fossil fuels, Hydro relies on its fossil-fuelled stations primarily to meet its needs for peaking power. The electricity production resources for the period 1981 through 1985 are shown in the chart below. The annual average costs per kilowatt-hour of energy by the major generating sources are shown in the Five-Year Summary of Financial Statistics.

Fuel and Fuel-related Costs

In 1985, fuel and related costs such as water rentals, power purchased, and the nuclear agreement-payback were 5.5 per cent lower than in 1984. Hydro's nuclear stations supplied 39 per cent of the total energy to the system in 1985. Hydraulic stations supplied 30 per cent and fossil-fuelled generation provided 24 per cent. Purchases of power from interconnected utilities provided the remaining 7 per cent. In 1984, electric energy from nuclear generation and fossil-fuelled generation supplied 33 per cent and 30 per cent, respectively, of the total energy to the system.

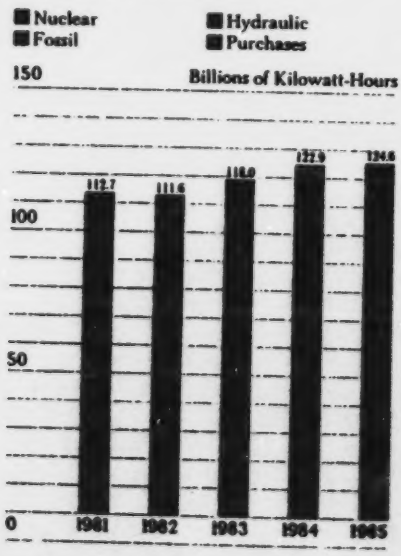
The 1985 fuel costs for coal and uranium amounted to $968 million, a decrease of 6.6 per cent over 1984. The decrease is mainly due to the replacement of higher-cost coal by more economical uranium. This more than offsets the effect of the increased volume of electricity generated to meet increased demand. The increase in electricity provided from nuclear sources reflects the additional units placed in service in 1985, and also the full year's production from nuclear units placed in service in 1984.

The payments Ontario Hydro makes primarily to the Province of Ontario for the use of provincial waters in its hydraulic plants amounted to $87 million in 1985, an increase of $26 million over 1984. This increase reflects the impact of the tripling of these water rental rates in mid-1984.

Electricity purchased from neighbouring utilities amounted to $163 million in 1985, an increase of $14 million over 1984. These purchases are generally made during peak demand periods or emergency situations.

In 1985, units 1 and 2 of the Pickering Nuclear Generating Station were not operating, having been taken out of service in 1983 to replace existing pressure tubes. The maintenance and overhead costs during the shutdown have been included in the payback calculation in accordance with the Pickering Payback Agreement. As a result, Hydro was able to reduce its 1985 and 1984 operating costs by $75 million and $36 million respectively, which represents the amount to be offset against future amounts payable by Ontario Hydro to Atomic Energy of Canada Limited and the Province of Ontario, the other two parties to this agreement.

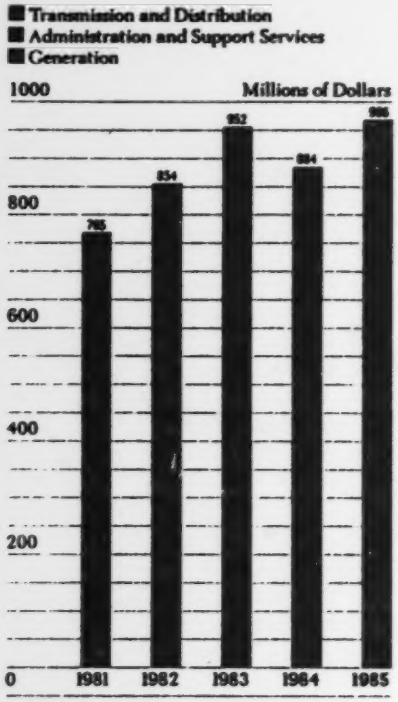
Electricity Production



Operation, Maintenance and Administration

The costs associated with the operation, maintenance and administration of the Corporation in 1985 were $966 million, an increase of $82 million over 1984. This increase of 9.3 per cent is primarily related to placing new facilities in service, and cost increases due to inflation. The continued emphasis on cost control at all levels of the Corporation is having a positive financial impact on operation, maintenance and administration costs. The in-service capacity of the generation system grew about 6 per cent or 1,612 megawatts in 1985. The major component of this growth is the addition of two nuclear generating units and one fossil-fuelled generating unit. The transmission and distribution system work load also grew in 1985, as reflected in an increase of approximately 2 per cent in the number of customers and an increase of about 1 per cent in the kilometres of rural lines maintained. The transmission and distribution, and administration and support services components of operation, maintenance and administration costs declined slightly in 1985, while the generation component increased slightly. The chart (see next page) shows the operation, maintenance and administration costs by major activity for the period 1981 through 1985.

Operation, Maintenance and Administration



Depreciation

The depreciation charged to operations totalled $655 million in 1985, $179 million or 37.6 per cent higher than in 1984. Contributing to that increase were the additional facilities placed in service, including Pickering unit 7, Bruce unit 5, the Atikokan Generating Station, and the full year's impact of Pickering unit 6 and Bruce unit 6 having been placed in service in 1984. In addition, the 1985 depreciation reflects an increase in the provision for the costs of removing pressure tubes in Pickering units 1 and 2. This increase resulted from advancing the timing of the retubing work.

Financing Charges

Financing charges are comprised of interest and foreign exchange costs. Interest charged to operations represents the total cost of borrowing less interest capitalized. This is designed to effect a proper allocation of costs between current and future customers. Foreign exchange mainly represents the amortization of unrealized gains or losses on the principal amount of foreign debt.

Gross interest costs for 1985 amounted to $2,551 million, an increase of $229 million or 9.9 per cent as compared with 1984. The primary reason for this increase is related to the additional funds borrowed during the year to finance the construction of new generating stations which are needed to meet future demand. In addition, gross interest payments also increased due to the effect of a weaker Canadian dollar relative to the American dollar on interest payments made in foreign currency.

Interest charged to operations amounted to $1,325 million in 1985, $376 million or 39.6 per cent higher than in 1984. The increase resulted primarily from placing additional nuclear generating units in service in 1985, and the full year's impact of units placed in service in 1984. The in-service date is the time from which interest is no longer capitalized and is charged to operations.

Foreign exchange costs amounted to $176 million in 1985, an increase of $58 million or 49.2 per cent over 1984. The major factor contributing to the increase in foreign exchange costs was the rise in the value of the American dollar relative to the Canadian dollar.

Net Income/Financial Soundness

Hydro earned a net income of $360 million in 1985 compared with $575 million in 1984. Net income has been invested in the Corporation and this has contributed to a gradual improvement in the trend of Ontario Hydro's debt ratio. The debt ratio at the end of 1985 was 83 per cent, the lowest level since the mid-1970s. The other main indicators of Ontario Hydro's financial soundness are the cash flow coverage and interest coverage ratios. The level of cash flow coverage for 1985 and 1984 were 1.02 times and 0.96 times, respectively. The level of interest coverage for 1985 and 1984 were 1.14 times and 1.25 times, respectively. The decrease in the interest coverage ratio has had no effect on the Corporation's ability to meet its interest payments and debt repayment obligations in 1985.

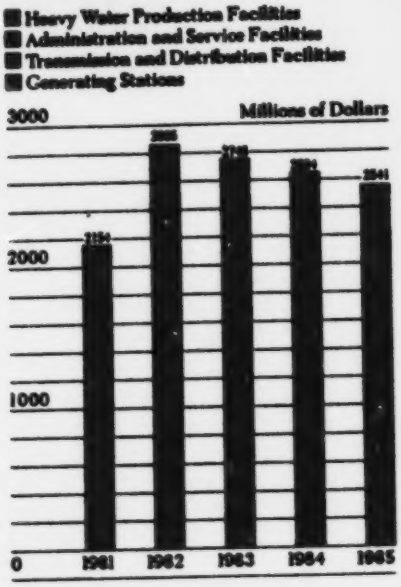
Capital Expenditures and Financing

Investment in Fixed Assets

Ontario Hydro invests in fixed assets to meet expected growth in the demand for electricity, to replace existing assets with facilities that are more economical, and to meet regulatory requirements. The total assets of the Corporation at the end of 1985 were $29,320 million and of this amount, about 82 per cent consists of fixed assets in service and under construction. This relatively high percentage reflects the capital-intensive nature of Ontario Hydro's business.

The investment in fixed assets during 1985 was $2,541 million. A major portion of the 1985 capital expenditures went toward the construction of new

Investment in Fixed Assets During the Year



generating facilities. Compared with 1984, there was a shift in the mix of the 1985 capital expenditures, reflecting the continued emphasis being placed on expenditures for transmission and distribution facilities. The expenditures on major capital projects under construction during 1985 and 1984 were:

	1985	1984
	millions of dollars	
Nuclear Generation		
Pickering	137	266
Bruce	417	680
Darlington	999	855
Fossil Generation		
Atikokan	109	109
Generating Facilities	1,662	1,910
Transmission & Distribution	249	169

Hydro placed in service unit 7 at Pickering and unit 5 at Bruce in January and March, 1985, respectively. The total cost was $2,368 million, including $461 million for heavy water. In addition, in November 1985, the fossil unit at the Atikokan Generating Station was placed in service at a cost of $748 million.

There has been a steady decline in the annual investment in fixed assets from $2,885 million in 1982 to $2,541 million in 1985, as the major generating projects are completed. The expenditures for investment in fixed assets for the period 1981 through 1985 are shown in the chart.

Financing

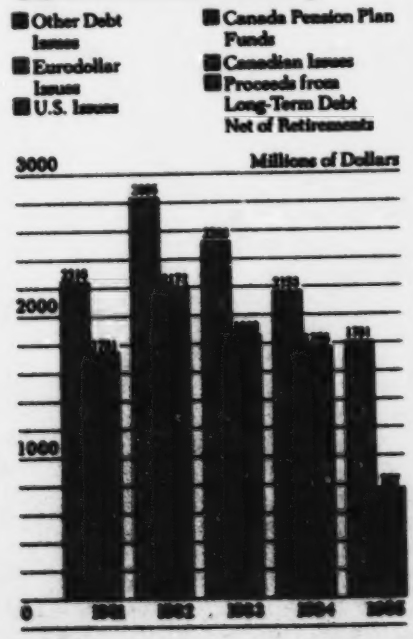
Cash required by Ontario Hydro to finance the investment in fixed assets is provided from two major sources: cash provided from operations and cash from external borrowings. For 1985, cash provided from operations, and cash from financing were 41.5 per cent and 29.8 per cent respectively, of the investment in fixed assets. Cash from borrowings represents the amount of cash provided from long-term debt less retirements. The balance of cash required for the investment in fixed assets was provided primarily as a result of a reduction in the level of corporate liquidity.

The 1985 proceeds from long-term debt, net of retirements, of $757 million were approximately 43 per cent of the 1984 level and the lowest since the mid-1970s. The proceeds from the issue of bonds by Ontario Hydro during 1985 amounted to $1,737 million. These proceeds were from eight Canadian issues with an average coupon interest rate of 10.8 per cent for an average term of nine years. For the same period in 1984, the average coupon interest rate and the average term of new debt issued were 12.5 per cent and 9.1 years respectively. In addition, proceeds of $44 million were received from the issues of long-term notes.

Cash provided from financing from 1981 through 1985 is shown in the chart. The principal markets Ontario Hydro has operated in are the Canadian, United States, and Eurodollar public markets. The borrowing requirements for 1985, except for $29 million, were met entirely from the Canadian public market to minimize foreign exchange exposure.

Cash amounting to $849 million was used to retire maturing long-term debt in 1985, compared with $266 million in 1984. In addition, during 1985, cash amounting to $175 million was used to redeem debt prior to maturity, compared with $131 million in 1984.

Cash Provided from Financing



Summary

Ontario Hydro's 1985 financial results reflected a 3.1 per cent growth in the volume of primary energy sales which was consistent with the average annual growth rate over the last five years. Cost control programs and productivity improvements continue to be effective.

The financial position of the Corporation has remained strong. Ontario Hydro was able to reduce the amount of net borrowings required in 1985 to less than half of the 1984 level. As a result, Ontario Hydro's debt ratio is now at the lowest level since the mid-1970s.

Summary of Significant Accounting Policies

The accompanying financial statements have been prepared by management in accordance with accounting principles generally accepted in Canada, applied on a basis consistent with that of the preceding year. In management's opinion, the financial statements have been properly prepared within reasonable limits of materiality and in the light of information available up to March 10, 1986.

Rate setting

Ontario Hydro has broad powers to generate, supply and deliver electric power throughout the Province of Ontario. The Corporation operates under the Power Corporation Act and is subject to provisions of the Ontario Energy Board Act.

Under the provisions of the Power Corporation Act, the price payable by customers for power is the cost of supplying the power. Such cost is defined in the Act to include the cost of operating and maintaining the system, depreciation, interest, and the amounts appropriated for debt retirement and stabilization of rates and contingencies. The debt retirement appropriation is the amount required under the Act to accumulate on a sinking fund basis over 40 years a sum equal to the debt incurred for the cost of the fixed assets in service. The appropriation for, or withdrawal from, the stabilization of rates and contingencies reserve is an amount established to maintain a sound financial position and to stabilize the effect of cost fluctuations.

Under the provisions of the Ontario Energy Board Act, a public hearing before the Ontario Energy Board is required in respect of any changes in electricity rates proposed by Ontario Hydro which affect its municipal utilities, direct industrial customers, or, if the Minister of Energy so directs, rural retail customers. The Ontario Energy Board submits its recommendations to the Minister of Energy. After considering the recommendations of the Ontario Energy Board, the Board of Directors of Ontario Hydro, under the authority of the Power Corporation Act, establishes the electricity rates to be charged to customers.

If the Board of Directors specifies a certain cost or gain is to be included in future electricity rates that, in accordance with the accounting policies summarized below, would be charged or credited to operations in the current year, then this cost or gain is deferred and amortized to future operations on a basis consistent with its inclusion in rates.

Fixed assets

Fixed assets in service include operating facilities and non-operating reserve facilities. Construction in progress includes fixed assets under construction and heavy water held for use in nuclear generating stations under construction.

Fixed assets are capitalized at cost which comprises material, labour, engineering costs, and the costs of training initial operating staff for new facilities as well as overheads, depreciation on service equipment, and interest applicable to capital construction activities. In the case of generation facilities, the cost also includes the net cost of commissioning, and for nuclear generation, the cost of heavy water. The net cost of commissioning is the cost of start-up less the value attributed to energy produced by generation facilities during their commissioning period. The cost of heavy water comprises the direct cost of production and applicable overheads, as well as interest and depreciation on the heavy water production facilities. For multi-unit facilities, a proportionate share of the cost of common facilities is placed in service with each major operating unit. Leases which transfer the benefits and risks of ownership of assets to Ontario Hydro are capitalized.

Interest is capitalized on construction in progress at rates (1985 – 13.9 per cent, 1984 – 13.8 per cent) which approximate the average cost of long-term funds borrowed in the years in which expenditures have been made for fixed assets under construction. If the construction period of a project is extended and the construction activities are continued, interest is capitalized during the period of extension provided that the project has a reasonable expectation of being completed.

If a project is cancelled or deferred indefinitely with a low probability of construction being resumed, all costs including the costs of cancellation are written off to operations.

If fixed assets are removed from operations and mothballed for future use, termed non-operating reserve facilities, the costs of mothballing are charged to operations.

Depreciation

The capital costs of fixed assets in service are depreciated on a straight-line basis. Depreciation rates for the various classes of assets are based on their estimated service lives. Major components of generating stations are depreciated over the lesser of the service life expectancy of the component or the remaining service life of the associated generating station.

The estimated service lives of assets for 1985 and 1984 in the major classes are:

Generating stations – hydraulic	– 65 to 100 years
– fossil	– 25 to 35 years
– nuclear	– 40 years
Heavy water	– over the period ending in the year 2040
Transmission and distribution	– 20 to 55 years
Administration and service	– 5 to 60 years
Heavy water production facilities	– 20 years

In accordance with group depreciation practices, for normal retirements the cost of fixed assets retired is charged to accumulated depreciation with no gain or loss being reflected in operations. However, gains and losses on sales of fixed assets, and losses on premature retirements are charged to operations in the year incurred as adjustments to depreciation expense.

When the costs of removal less residual value, termed removal costs, on retirements of fixed assets can be reasonably estimated and are significant, provisions for these costs are charged to depreciation expense on an annuity basis over the remaining service life of the related fixed assets. Other removal costs are charged to depreciation expense as incurred. Removal costs include the estimated costs of decommissioning nuclear stations and the estimated costs of removing certain nuclear reactor fuel channels.

Changes in the estimated service lives of fixed assets and in the significant assumptions underlying the estimates of fixed asset removal costs are subject to periodic review. Such changes are implemented on a remaining service life basis from the year the changes can be first reflected in electricity rates.

Non-operating reserve facilities are amortized so that any estimated loss in value is charged to depreciation expense on a straight-line basis over their expected non-operating period.

Unamortized advances for fuel supplies

As part of its program to ensure the adequate supply of fuels for its generating stations, Ontario Hydro has entered into long-term fuel supply contracts. Where these contracts require Ontario Hydro to make payments for pre-production costs to suppliers in advance of the fuel delivery, these payments and associated costs, including interest, are carried in the accounts as unamortized advances for fuel supplies. The advances are amortized to fuel inventory as the fuels are delivered.

Fuel for electric generation

Fuel used for electric generation comprises the average inventory costs of fuel consumed, charges for commissioning energy produced, and provisions for disposal of nuclear fuel irradiated during the period. The inventory cost of fuel consumed comprises fuel purchases, transportation and handling costs, and the amortization of advances for fuel supplies. Transportation costs include charges for interest and depreciation on railway equipment owned by Ontario Hydro.

The charges for commissioning energy produced during the period represent the incremental operating and fuel costs of producing the same quantity of energy at generating units displaced because of the commissioning activity. The costs for disposal of nuclear fuel irradiated in each period are charged to operations based on estimated future expenditures and interest accumulating to the estimated date of disposal. Estimates of expenditures, interest and escalation rates, and the date of disposal are subject to periodic review. Adjustments resulting from changes in estimates are charged to operations on an annuity basis over the period from the year the changes can be first reflected in electricity rates to the estimated in-service date of the disposal facility.

Foreign currency translation
Current monetary assets and liabilities are translated to Canadian currency at year-end rates of exchange and the resulting gains or losses are credited or charged to operations. Long-term debt payable in foreign currencies is translated to Canadian currency at year-end rates of exchange. Resulting unrealized exchange gains or losses are deferred and included in unamortized debt costs, and are amortized to operations on an annuity basis over the remaining life of related debt. Foreign exchange gains or losses on early redemption of long-term debt are deferred and included in unamortized debt costs, and are amortized to operations on an annuity basis over the average life of debt denominated in the same currency issued during the previous year.

Unamortized debt costs
Unamortized debt costs include the unamortized amounts related to unrealized foreign exchange gains or losses resulting from the translation of foreign currency long-term debt, foreign exchange gains or losses on the early redemption of long-term debt, and discounts or premiums arising from the issuance of debt or the acquisition of debt prior to maturity.

Debt discounts or premiums arising on the issuance of debt are amortized over the period to maturity of the debt. Discounts or premiums on debt acquired prior to the date of maturity are amortized over the period from the acquisition date to the original maturity date of the debt.

Nuclear agreement – Pickering units 1 and 2
Ontario Hydro, Atomic Energy of Canada Limited and the Province of Ontario are parties to a joint undertaking for the construction and operation of units 1 and 2 of Pickering Nuclear Generating Station, with ownership of these units being vested in Ontario Hydro. Contributions to the capital cost by Atomic Energy of Canada Limited and the Province of Ontario amounted to $258 million and these have been deducted in arriving at the value of fixed assets in service in respect of Pickering units 1 and 2. Ontario Hydro is required to make monthly payments until the year 2001 to each of the parties in proportion to their capital contributions. These payments, termed "payback", represent in a broad sense the net operational advantage of having the power generated by Pickering units 1 and 2 as compared with coal-fired units similar to Lambton units 1 and 2.

Pension plan
The pension plan is a contributory, defined benefit plan covering all regular employees of Ontario Hydro. Ontario Hydro is responsible for all deficiencies and surpluses in the pension plan. Pension costs, as actuarially determined, consist of current service costs and amounts required to amortize any surpluses or unfunded liabilities. A net unfunded liability arising from past service obligations is amortized up to fifteen years. All other net unfunded liabilities or net surpluses in the fund are amortized up to five years.

Research and development
Research and development costs are charged to operations in the year incurred, except for those related directly to the design or construction of a specific capital facility which are capitalized as part of the facility.

Auditors' Report

To the Board of Directors of Ontario Hydro:

We have examined the statement of financial position of Ontario Hydro as at December 31, 1985 and the statements of operations, equities accumulated through debt retirement appropriations, reserve for stabilization of rates and contingencies and source of cash used for investment in fixed assets for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of Ontario Hydro as at December 31, 1985 and the results of its operations and the source of cash used for investment in fixed assets for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Toronto, Canada,
March 10, 1986.

CLARKSON GORDON
Chartered Accountants

Ontario Hydro
Statement of Operations
for the year ended December 31, 1985

	1985	1984
	millions of dollars	
Revenues		
Primary power and energy		
Municipal utilities	2,891	2,555
Rural retail customers	815	712
Direct industrial customers	568	516
	4,274	3,783
Secondary power and energy (note 1)	351	429
	4,625	4,212
Costs		
Operation, maintenance and administration	966	884
Fuel used for electric generation	968	1,036
Water rentals (note 2)	87	61
Power purchased	163	149
Nuclear agreement – payback (note 3)	(75)	(36)
Depreciation (note 4)	655	476
	2,764	2,570
Income before financing charges	1,861	1,642
Interest (note 5)	1,325	949
Foreign exchange (note 6)	176	118
	1,501	1,067
Net income	360	575
Appropriation for:		
Debt retirement	252	210
Stabilization of rates and contingencies	108	365
	360	575

See accompanying summary of significant accounting policies and notes to financial statements.

Ontario Hydro
Statement of Financial Position
as at December 31, 1985

	1985	1984
Assets	millions of dollars	
Fixed assets (note 7)		
Fixed assets in service	20,604	17,215
Less accumulated depreciation	4,614	4,069
	15,990	13,146
Construction in progress	8,159	9,001
	24,149	22,147
Current assets		
Cash and short-term investments	18	658
Accounts receivable	550	442
Fuel for electric generation (note 8)	1,015	973
Materials and supplies, at cost	215	179
	1,798	2,252
Other assets		
Unamortized debt costs	1,897	1,447
Unamortized advances for fuel supplies (note 9)	899	883
Unamortized deferred costs (note 10)	313	358
Long-term accounts receivable and other assets	264	214
	3,373	2,902
	29,320	27,301

See accompanying summary of significant accounting policies and notes to financial statements.

	1985	1984
	millions of dollars	
Liabilities		
Long-term debt (note 11)	22,518	20,659
Current liabilities		
Accounts payable and accrued charges	549	616
Short-term notes payable	223	49
Accrued interest	710	672
Long-term debt payable within one year	407	847
	1,889	2,184
Other liabilities		
Long-term accounts payable and accrued charges	158	152
Accrued irradiated fuel disposal and fixed asset removal costs (note 12)	311	222
	469	374
Contingencies (notes 3, 9 and 13)		
Equity		
Equities accumulated through debt retirement appropriations	2,618	2,366
Reserve for stabilization of rates and contingencies	1,699	1,591
Contributions from the Province of Ontario as assistance for rural construction	127	127
	4,444	4,084
	29,320	27,301

On behalf of the Board

Tom Campbell
Chairman

Robert Franklin
President

Toronto, Canada,
March 10, 1986.

Ontario Hydro
Statement of Equities Accumulated Through Debt Retirement Appropriations
for the year ended December 31, 1985

	Municipal Utilities	Power District (Rural Retail and Direct Industrial Customers)	Totals 1985	Totals 1984
		millions of dollars		
Balances at beginning of year	1,653	713	2,366	2,156
Appropriation	172	80	252	210
Transfers and refunds on annexations by municipal utilities	2	(2)	–	–
Balances at end of year	1,827	791	2,618	2,366

Statement of Reserve for Stabilization of Rates and Contingencies
for the year ended December 31, 1985

	Held for the benefit of all customers	Held for the benefit of (or recoverable from) certain groups of customers			Totals	
		Municipal Utilities	Rural Retail Customers	Direct Industrial Customers	1985	1984
			millions of dollars			
Balances at beginning of year	1,614	1	(23)	(1)	1,591	1,226
Appropriation	128	–	(16)	(4)	108	365
Balances at end of year	1,742	1	(39)	(5)	1,699	1,591

See accompanying summary of significant accounting policies and notes to financial statements.

Ontario Hydro
Statement of Source of Cash Used for Investment in Fixed Assets
For the year ended December 31, 1985

	1985	1984
	millions of dollars	
Operating activities		
Cash provided from operations (note 14)	1,055	1,088
Financing activities		
Long-term debt issued	1,781	2,153
Less retirements	1,024	397
Cash provided from financing	757	1,756
Investing activities in other assets – decrease (increase) (note 14)	18	(28)
Cash from operating, financing and other investing activities	1,830	2,816
Changes in cash and cash equivalents – decrease (increase)	814	(277)
Cash used for investment in fixed assets	2,644	2,539
Changes in accounts payable and accrued charges affecting investment in fixed assets – (decrease) increase	(103)	85
Investment in fixed assets	2,541	2,624

See accompanying summary of significant accounting policies and notes to financial statements.

1. Secondary power and energy

Secondary power and energy revenues include $350 million (1984 – $427 million) from sales of electricity to United States utilities.

2. Water rentals

Water rentals are the amounts paid primarily to the Province of Ontario for the use of water for hydraulic generation.

3. Nuclear agreement – payback

During 1983, units 1 and 2 of the Pickering Nuclear Generating Station were shut down for replacement of pressure tubes and did not operate for a period of time in 1983, and during 1984 and 1985. The Nuclear Agreement, which is described in the Summary of Significant Accounting Policies, allows maintenance and overhead costs during the shutdown period to be included in payback calculations. The calculations have resulted in negative payback amounts of $8 million in 1983, $36 million in 1984 and $75 million in 1985. These amounts, totalling $119 million, have been credited against the costs of operations for the respective years and are included in "long-term accounts receivable and other assets". The basis for this accounting treatment is the belief by Ontario Hydro that under the Nuclear Agreement, these amounts, termed "negative payback", plus interest, can be offset against future positive payback amounts payable to the Province of Ontario and to Atomic Energy of Canada Limited when the units return to service. Atomic Energy of Canada Limited has objected to this interpretation and takes the position that "negative payback" is not to be offset against future positive payback amounts. The interpretation of the Nuclear Agreement and the manner of recovering costs associated with the rehabilitation of units 1 and 2 are being discussed among the parties to the Nuclear Agreement.

In accordance with an agreement dated March 14, 1983, between Atomic Energy of Canada Limited and Ontario Hydro, provisions for irradiated fuel disposal costs related to Pickering Nuclear Generating Station units 1 and 2 have been included, subject to further discussions, in the calculation of payback for the years 1982, 1983 and 1984. The parties to the Nuclear Agreement are discussing whether these provisions are properly allowable costs for the period 1982 to 1984, and also whether such costs should continue to be included in the calculation of payback subsequent to 1984. Atomic Energy of Canada Limited and the Province of Ontario's share of irradiated fuel disposal costs included in the calculation of payback for the years 1982, 1983 and 1984 totalled $16 million at December 31, 1984. The provisions for 1985 are not significant as the Pickering units 1 and 2 did not operate during the year.

4. Depreciation

	1985	1984
	millions of dollars	
Depreciation of fixed assets in service	594	511
Amortization of deferred costs	39	40
Provision for net removal costs	104	30
Other removal costs	10	13
	747	594
Less:		
Depreciation charged to – heavy water production	50	80
– construction in progress	27	26
– fuel for electric generation	2	2
Net gain on sales of fixed assets	13	10
	92	118
	655	476

5. Interest

	1985	1984
	millions of dollars	
Interest on bonds, notes, and other debt	2,523	2,298
Interest on accrued irradiated fuel disposal and fixed asset removal costs	28	24
	2,551	2,322
Less:		
Interest charged to – construction in progress	933	1,063
– heavy water production	116	117
– fuel for electric generation	102	97
– unamortized advances for fuel supplies	15	16
Interest earned on investments	60	80
	1,226	1,373
	1,325	949

6. Foreign exchange

	1985	1984
	millions of dollars	
Amortization of foreign exchange gains and losses	190	120
Net exchange gain on other foreign transactions	(14)	(2)
	176	118

7. Fixed assets

	1985		
	Assets in Service	Accumulated Depreciation	Construction in Progress
		millions of dollars	
Generating stations – hydraulic	1,830	544	11
– fossil	2,836	697	32
– nuclear	6,805	718	6,561
Heavy water	1,605	136	1,187
Transmission and distribution	4,462	1,182	304
Administration and service	915	383	64
Heavy water production facilities	1,128	285	–
Non-operating reserve facilities			
– fossil generating stations	786	432	–
– heavy water production facilities	237	237	–
	20,604	4,614	8,159

7. Fixed assets (Continued)

	1984		
	Assets in Service	Accumulated Depreciation	Construction in Progress
	millions of dollars		
Generating stations – hydraulic	1,818	514	13
– fossil	2,041	629	655
– nuclear	4,898	542	6,747
Heavy water	1,149	112	1,308
Transmission and distribution	4,310	1,088	241
Administration and service	845	341	37
Heavy water production facilities	1,123	232	–
Non-operating reserve facilities			
– fossil generating stations	794	374	–
– heavy water production facilities	237	237	–
	17,215	4,069	9,001

Non-operating reserve facilities consist of Lennox, R.L. Hearn, J.C. Keith and Thunder Bay unit 1 fossil generating stations, and Bruce Heavy Water Plant "A". Substantially all of the undepreciated cost of non-operating reserve facilities is related to Lennox generating station, which based on current forecasts, is expected to return to operations in the late 1990s.

Construction in progress at December 31, 1985:

	Remaining Number of Units Scheduled	Planned In-Service Dates	Dependable Capacity to be Placed in Service	Costs Incurred to December 31, 1985	Estimated Costs to Complete (Excluding Escalation and Interest)
			megawatts	millions of dollars	
Nuclear generating stations (including heavy water)					
Pickering "B"	1	1986	516	924	56
Bruce "B"	2	1986-87	1,590	2,730	134
Darlington	4	1988-92	3,524	3,746	3,165
All other construction in progress	–	–	–	759	–
				8,159	

Estimated costs to complete are the most recent projections. These estimates exclude cost escalation and interest which are forecast to average 7% and 12% per year, respectively, over the period 1986 to 1992. Because of the uncertainties associated with long construction lead times and planned in-service dates, these costs to complete are subject to change.

The fuel channel replacement program for Pickering "A" units 1 and 2 is estimated to cost $415 million, excluding interest and escalation. Of this total, $262 million is to be capitalized as installation costs, and the remaining $153 million is related to the removal costs of the existing pressure tubes and is being recovered through charges to operations as described in note 12. The actual expenditures for installation costs, including interest of $30 million, totalled $160 million as of December 31, 1985 and are included in all other construction in progress in the above table. The first two units of Pickering "A" are expected to be returned to service in 1987.

For 1986, additional investment in fixed assets is estimated to be approximately $2,465 million including escalation and interest.

8. Fuel for electric generation

	1985	1984
	millions of dollars	
Inventories – uranium	533	427
– coal	482	546
	1,015	973

9. Unamortized advances for fuel supplies

	1985	1984
	millions of dollars	
Uranium – Rio Algom Limited	450	447
– Denison Mines Limited	355	354
	805	801
Coal	94	82
	899	883

Unamortized advances for fuel supplies are recovered as fuel is delivered. Contractual obligations for additional advance payments for uranium supplies together with interest capitalization approximately equal the amortization of advances for uranium supplies over the next five years.

Ontario Hydro has entered into long-term contracts with Denison Mines Limited and Rio Algom Limited for uranium supplies through to 2012 and 2024, respectively. Ontario Hydro's current forecast of the annual requirements for uranium is approximately 1,200 megagrams for 1986, increasing to approximately 1,800 megagrams by 1994. The forecasted requirements and contracted deliveries are in balance up to 1994. Commencing in 1994 through to 2012, contracted deliveries exceed requirements of the nuclear generating facilities currently in service and under construction by approximately 900 megagrams per year. Ontario Hydro's options for managing the oversupply include resale of the uranium and, under specified conditions, cancellation or renegotiation of the contracts. In the event that a contract is cancelled, the supplier is not required to refund any outstanding advances. At this time, the likelihood of a contract cancellation and the financial implications of pursuing the options are not determinable.

10. Unamortized deferred costs

	1985	1984
	millions of dollars	
Bruce Heavy Water Plant "D"	280	317
Wesleyville Generating Station	33	41
	313	358

Bruce Heavy Water Plant "D" is an indefinitely deferred project with a low probability of construction being resumed. The capital cost of this project and the unamortized deferred costs associated with the cancelled Wesleyville generating station project were not written off directly to operations since the Board of Directors under its rate setting authority decided that these costs be amortized for recovery through electricity rates over the period 1984 through 1993, which results in an annual charge of $39 million for 1985.

11. Long-term debt

	1985	1984
	millions of dollars	
Bonds and notes payable	22,728	21,293
Other long-term debt	197	213
	22,925	21,506
Less payable within one year	407	847
	22,518	20,659

Bonds and notes payable:
Bonds and notes payable, expressed in Canadian dollars, are summarized by years of maturity and by the currency in which they are payable in the following table:

Years of Maturity	1985 Principal Outstanding			1985 Weighted Average Coupon Rate	1984 Principal Outstanding	1984 Weighted Average Coupon Rate
	Canadian	Foreign	Total	per cent	Total	per cent
	millions of dollars				millions of dollars	
1985	–	–	–		827	
1986	150	236	386		351	
1987	732	307	1,039		991	
1988	852	339	1,191		1,158	
1989	519	828	1,347		1,323	
1990	953	803	1,756		–	
1-5 years	3,206	2,513	5,719	11.5	4,650	11.7
6-10 years	2,207	2,819	5,026	12.8	4,882	12.7
11-15 years	1,687	786	2,473	9.5	1,807	8.6
16-20 years	2,676	1,420	4,096	11.2	4,010	11.6
21-25 years	1,740	2,265	4,005	10.5	4,168	9.9
26-30 years	323	1,086	1,409	14.8	1,776	14.5
	11,839	10,889	22,728	11.5	21,293	11.6
Currency in which payable:						
Canadian dollars			11,839		10,658	
United States dollars			10,699		10,498	
Swiss francs			122		92	
West German Deutsche marks			41		45	
United Kingdom pounds sterling			27		–	
			22,728		21,293	

Bonds and notes payable in United States dollars include Canadian $7,190 million (1984 – Canadian $6,966 million) of Ontario Hydro bonds held by the Province of Ontario and having terms identical with Province of Ontario issues sold in the United States on behalf of Ontario Hydro. Bonds and notes payable are either held, or guaranteed as to principal and interest, by the Province of Ontario.

11. Long-term debt (Continued)

Other long-term debt:

	Years of Maturity	Interest Rate	1985	1984
		per cent	millions of dollars	
Balance due to Atomic Energy of Canada Limited on purchase of Bruce Heavy Water Plant "A"	1992	7.8	137	150
Capitalized lease obligation for the Head Office building, payable in U.S. dollars	2005	8.0	53	51
Capitalized lease obligations for transport and service equipment	1986 to 1988	6.8 to 11.0	7	12
			197	213

Payments required on the above debt, excluding interest, will total $103 million over the next five years. The amount payable within one year is $21 million (1984 – $20 million).

12. Accrued irradiated fuel disposal and fixed asset removal costs

	1985	1984
	millions of dollars	
Accrued irradiated fuel disposal costs	189	147
Accrued fixed asset removal costs	122	75
	311	222

Irradiated fuel disposal costs:

The significant assumptions used in estimating the future irradiated fuel disposal costs were:
- an in-service date of the year 2010 for irradiated nuclear fuel disposal facilities;
- a transportation distance of 1,000 kilometres from nuclear generating facilities to disposal facilities;
- interest rates through to the disposal date ranging from 10% to 15% (1984 – 10% to 16%); and
- escalation rates through to the disposal date ranging from 5% to 12% (1984 – 6% to 12%).

Because of the uncertainties associated with the technology of disposal, and the above factors, these costs are subject to change.

Fixed asset removal costs:

Fixed asset removal costs are the costs of decommissioning nuclear generating stations after the end of their service lives, and the costs of removing certain fuel channels from nuclear reactors which are expected to be replaced during the life of the reactors.

The significant assumptions used in estimating decommissioning costs were:
- decommissioning on the deferred dismantlement basis (dismantlement following storage with surveillance for a 30-year period after shutdown of the reactors);
- a transportation distance of 1,000 kilometres from nuclear generating facilities to disposal facilities;
- interest rates through to 2061 ranging from 10% to 15% (1984 – 10% to 16%); and
- escalation rates through to 2061 ranging from 5% to 12% (1984 – 6% to 12%).

The significant assumptions used in estimating the fuel channel removal costs were:
- removal of fuel channels in Pickering Nuclear Generating Station "A" units 1 and 2 in the 1984 to 1987 period, and units 3 and 4 in the 2000 to 2003 period,

12. Accrued irradiated fuel disposal and fixed asset removal costs (Continued)

and Bruce Nuclear Generating Station "A" units 1 to 3 in the 2002 to 2007 (1984 – 1998 to 2006) period;
- interest rates through to 2007 (1984 – to 2006) ranging from 10% to 13% (1984 – 10% to 16%); and
- escalation rates through to 2007 (1984 – to 2006) ranging from 6% to 9% (1984 – 6% to 11%).

Because of the uncertainties associated with the technology of decommissioning and fuel channel removal, and the above factors, these costs are subject to change.

The fuel channel removal costs incurred to date of $89 million related to Pickering "A" units 1 and 2 exceed the amounts provided as of December 31, 1985 by $11 million. The amount of $11 million is included with "Long-term accounts receivable and other assets" and will be recovered by way of annual provision through to 1987 when both units are expected to return to service.

13. Fuel oil contract

Ontario Hydro contracted with Petrosar Limited for the purchase of 20,000 barrels of residual fuel oil per day through to April, 1992. Deliveries for the years 1981 and 1982 were 6% and 2%, respectively, of the contract quantities. No deliveries were taken during 1983, 1984 and 1985. Amounts have been charged to the costs of operations in prior years to provide for settlement with respect to reduced deliveries up to and including 1982. Ontario Hydro advised Petrosar Limited on May 24, 1983 that the contract is at an end due to Petrosar Limited's prior undertaking to the Government of Canada to limit its production of residual fuel oil to an amount less than the contracted quantities. Petrosar Limited has commenced actions claiming damages of $45.5 million and $59.9 million for failure to take the contract quantities in 1981 and 1982 respectively. Ontario Hydro has counterclaimed for $39.4 million paid to Petrosar Limited in 1980, 1981 and 1982 and an accounting for the difference between market and contract prices for residual fuel oil supplied since the date of such undertaking. The trial on this matter in the Supreme Court of Ontario commenced on November 25, 1985 and is expected to be completed in the latter part of March, 1986. At this time, the decision of the court and any financial implications for Ontario Hydro are not determinable.

14. Statement of Source of Cash Used for Investment in Fixed Assets

The Statement of Source of Cash Used for Investment in Fixed Assets reports changes in cash and cash equivalents, defined to be cash and short-term investments net of short-term notes payable, rather than working capital, which was the practice in prior years. The 1984 amounts have been reclassified to conform with the 1985 financial statement presentation.

Cash provided from operations is derived as follows:

	1985	1984
	millions of dollars	
Net Income	360	575
Items not requiring cash in the current year		
Depreciation	655	476
Amortization of foreign exchange gains and losses	190	120
Provision for irradiated fuel disposal costs	24	21
Nuclear agreement – payback	(75)	(36)
Other	21	21
Funds provided from operations	1,175	1,177
Changes in working capital, excluding cash and cash equivalents, and long-term accounts payable affecting operations – (increase)	(120)	(89)
Cash provided from operations	1,055	1,088

14. Statement of Source of Cash Used for Investment in Fixed Assets (Continued)

Investment in other assets is derived as follows:

	1985	1984
	millions of dollars	
Advances and related costs for fuel supplies	(37)	(46)
Less repayments and amortization of advances for fuel supplies	39	57
	2	11
Other	16	(39)
Investment in other assets – decrease (increase)	18	(28)

15. Pension and insurance plans

Ontario Hydro's employee benefit programs include pension and insurance plans. The assets of the pension, group life insurance and long-term disability plans and the changes in assets during the year are shown in the financial statements of The Pension and Insurance Fund, and are not included in Ontario Hydro's financial statements.

The most recent actuarial valuation of Ontario Hydro's pension plan as at December 31, 1984 reported a surplus of approximately $220 million (December 31, 1983 – $115 million). The increase in the pension plan surplus during 1984 is attributable to an experience surplus of $133 million, partially offset by the amortization of $28 million of the established surplus. On January 1, 1985, $42 million of the $220 million surplus was applied towards plan improvements to the pension plan.

The significant actuarial assumptions used in the 1984 and 1983 valuations were:

- rate used to discount future investment income – 8.5%, and future benefits – 8%;
- salary escalation rate – 8%;
- average retirement age for males – 60.3 (1983 – 61.2) and for females – 61.2 (1983 – 60.7); and
- corporate shares valuation – five-year average.

The pension plan costs for 1985 were $21 million (1984 – $51 million) after the deduction of $58 million (1984 – $28 million) for the amortization of pension plan surplus.

The group life insurance plan had a surplus of approximately $34 million as of December 31, 1985 (December 31, 1984 – $33 million). This surplus, subject to approval by an order-in-council from the Province of Ontario, will be used to pay the insurance premiums for all employees who are members of the plan.

16. Research and development

In 1985, approximately $63 million of research and development costs were charged to operations and $17 million were capitalized (1984 – $55 million and $17 million, respectively).

Ontario Hydro
Five-Year Summary of
Financial Statistics

	1985	1984	1983	1982	1981
			millions of dollars		
Revenues					
Primary power and energy					
Municipal utilities	2,891	2,555	2,265	1,997	1,800
Rural retail customers	815	712	644	576	546
Direct industrial customers	568	516	448	395	391
	4,274	3,783	3,357	2,968	2,737
Secondary power and energy	351	429	448	419	424
	4,625	4,212	3,805	3,387	3,161
Costs					
Operation, maintenance and administration	966	884	952	854	765
Fuel and fuel related[1]	1,143	1,210	1,169	1,094	955
Depreciation	655	476	396	348	325
	2,764	2,570	2,517	2,296	2,045
Income before financing charges	1,861	1,642	1,288	1,091	1,116
Financing charges					
Gross interest	2,551	2,322	2,012	1,708	1,370
Capitalized interest	(1,166)	(1,293)	(1,194)	(968)	(628)
Investment income	(60)	(80)	(58)	(67)	(85)
Foreign exchange	176	118	56	70	52
	1,501	1,067	816	743	709
Net income	360	575	472	348	407
Financial position					
Total assets	29,320	27,301	23,194	20,721	17,830
Fixed assets	24,149	22,147	19,948	17,600	15,448
Long-term debt	22,518	20,659	17,977	15,882	13,663
Equity	4,444	4,084	3,509	3,037	2,690
Source and use of cash[1]					
Cash from operations	1,055	1,088	950	686	708
Cash from financing	757	1,756	1,823	2,172	1,731
Investment in fixed assets	2,541	2,624	2,746	2,885	2,154
Financial indicators					
Debt ratio[2]	.830	.833	.840	.845	.841
Cash flow coverage[3]	1.02	.96	.88	.89	1.05
Interest coverage[4]	1.14	1.25	1.24	1.20	1.30

	1985	1984	1983	1982	1981
Average revenue[5]			in cents per kilowatt-hour of total energy sales		
Primary power and energy					
Municipal utilities	3.754	3.440	3.210	2.981	2.710
Rural retail customers	5.561	5.143	5.027	4.475	4.269
Direct industrial customers	3.154	2.896	2.740	2.614	2.290
Secondary power and energy	4.098	4.037	3.768	3.895	3.838
All classifications combined	3.879	3.586	3.409	3.203	2.945
Average rate increases			expressed as a per cent		
Municipal utilities	8.5	8.0	8.2	9.6	9.3
Rural retail customers	8.7	7.5	8.8	8.7	11.2
Direct industrial customers	8.8	7.6	8.5	10.0	9.6
Average cost[5][6]			in cents per kilowatt-hour of energy generated		
Hydraulic					
Operation, maintenance and administration	.186	.184	.159	.173	.149
Fuel – water rentals	.233	.164	.076	.073	.066
Depreciation and financing charges	.399	.384	.345	.360	.351
	.818	.732	.580	.606	.566
Nuclear					
Operation, maintenance and administration	.481	.506	.491	.487	.411
Fuel – uranium	.426	.361	.357	.384	.232
Depreciation and financing charges	2.018	1.330	1.026	.883	.807
	2.925	2.197	1.874	1.754	1.450
Fossil					
Operation, maintenance and administration	.415	.348	.368	.402	.374
Fuel – coal, gas and oil	2.609	2.500	2.417	2.328	2.097
Depreciation and financing charges	.882	.597	.586	.683	.611
	3.906	3.445	3.371	3.413	3.082

Footnotes

(1) Figures for 1981-1984 have been reclassified to conform with the 1985 financial statement presentation.

(2) Debt ratio represents debt (bonds and notes payable, short-term notes payable, other long-term debt, and accrued irradiated fuel disposal and fixed asset removal costs less unamortized foreign exchange gains and losses) divided by debt plus equity.

(3) Cash flow coverage ratio represents funds provided from operations plus net interest, and interest charged to fuel for electric generation less interest on accrued provisions divided by interest on bonds, notes, and other debt.

(4) Interest coverage represents net income plus interest on bonds, notes, and other debt divided by interest on bonds, notes, and other debt.

(5) Figures for 1985 are preliminary.

(6) Average cost per kilowatt-hour represents the costs attributable to generation but excludes the costs related to transmission, distribution and corporate administrative activities. These figures reflect the historical accounting costs of operating facilities and the actual energy generated by these facilities during the year.

Ontario Hydro
Comparative Statistics

	1985	1984	1983	1982	1981
Customer statistics[1]			in millions of kilowatt-hours		
Primary energy sales					
Municipal utilities	77,017	74,279	70,601	67,019	66,416
Rural retail	14,235	13,867	12,825	12,867	12,783
Direct industrial	17,963	17,817	16,348	15,119	17,077
	109,215	105,963	99,774	95,005	96,276
Secondary energy sales	8,565	10,627	11,900	10,753	11,063
Total Ontario customers			in thousands		
Residential	2,707	2,652	2,604	2,559	2,528
Farm	106	107	108	110	110
Commercial and industrial	353	346	339	335	329
	3,166	3,105	3,051	3,004	2,967
Average annual use			in kilowatt-hours per customer		
Residential	10,800	10,590	10,149	9,976	9,852
Farm	22,618	22,556	21,389	21,135	20,731
Commercial and industrial	215,000	212,700	200,436	194,376	204,575
Average revenue			in cents per kilowatt-hour		
Residential	5.39	5.02	4.69	4.34	3.96
Farm	5.74	5.24	4.87	4.50	4.11
Commercial and industrial	4.01	3.74	3.50	3.28	2.92
Operating statistics					
Dependable peak capacity ('000 kW)[2]	28,224	26,612	25,269	24,906	24,595
December primary peak demand ('000 kW)	20,473	18,052	18,792	16,872	16,600
Primary energy made available ('000,000 kW.h)	116,049	112,293	106,071	100,836	101,659
Total staff, average for year (includes regular and temporary staff)	31,166	29,613	31,233	32,654	30,850

Footnotes

(1) Figures for 1985 are preliminary.

(2) Includes mothballed generation: 1985 – 3,932,700 kW; 1984 – 3,999,200 kW; 1983 – 3,783,200 kW; 1982 – 3,034,200 kW; and 1981 – 1,913,000 kW.